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Work Plan for the Remedial Investigation/Feasibility Study Standard Chlorine of Delaware Site New Castle County, Delaware

Volume 1 – Technical Approach

Work Assignment No. 045-RICO03H6
Contract 68-S7-3002

January 5, 2004

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1.0 Introduction

The United States Environmental Protection Agency (EPA), using the Remedial Action Contract (RAC) Number 68-S7-3002, authorized the Tetra Tech/Black &Veatch Joint Venture (JV) to perform a Remedial Investigation and Feasibility Study (RI/FS) at the Standard Chlorine of Delaware Site (SCD), located in New Castle County, Delaware. The RI/FS activities will be conducted under Work Assignment Number 045-RICO03H6 in accordance with the Statement of Work issued by the EPA to the JV dated October 2, 2003. Black & Veatch Special Projects Corporation (Black & Veatch) will serve as the JV's technical and project management lead for this RI/FS.

1.1 Site Location and Background

The SCD Site is located on Governor Lea Road, in an industrialized area located approximately three miles northeast of Delaware City in New Castle County, Delaware. Residential and commercial properties are located within one mile of the facility (to the west). The SCD Site is bordered to the east by Occidental Chemical Company (formerly Diamond Shamrock Company) property, to the west by Air Products, Inc. and to the south by Governor Lea Road. Governor Lea Road separates the SCD Site from property owned by Motiva Enterprises, LLC (formerly Star Enterprises) and Connectiv (formerly Delmarva Power and Light). The fence line of the former SCD manufacturing facility (the Facility) encompasses approximately 26 acres. The SCD Site (the Site) encompasses approximately 65 acres with its southernmost boundary adjacent to Governor Lea Road and its northern boundary extending into Red Lion Creek. The site location is presented in Figure 1 and the site layout and areas of interest are presented in Figure 2.

1.1.1 Operational History

The SCD facility was built in 1965 on approximately 46 acres of farmland that was previously owned by the Diamond Alkali Company. The Diamond Alkali Company had previously purchased the land from the Tidewater Refinery Company. Chlorinated benzene compounds were manufactured on site from 1966 until the facility was closed in May 2002. Chlorine (piped in from the Occidental Chemical facility) and benzene (obtained primarily from the Motiva facility located on the south side of Governor Lea Road) were the main raw materials for chlorinated benzene production processes. The facility underwent an expansion in the early 1970s to begin production of chlorinated nitrobenzene and to increase production of chlorobenzene, dichlorobenzene, and trichlorobenzene. Production of chlorinated nitrobenzene ended in the late 1970s, and the related capacity was switched to the production of chlorobenzene. The facility was expanded again in the late 1970s. Following that expansion, the SCD facility produced chlorobenzene, paradichlorobenzene, various isomers of trichlorobenzene, and chlorobenzene-based insulating fluids (Weston, 1993).

In December of 1998, SCD was sold as a whole to Metachem Products, LLC (Metachem). According to Metachem's former Environmental Manager, Metachem also purchased all of the

land located between the facility boundaries and the Red Lion Creek that was known to have been impacted by SCD's releases.

On April 30, 2002, following the bankruptcy of one of their major customers, Metachem announced that they would be closing the SCD facility. At that time, Metachem did not specify a closing date, and they left open the possibility of having the plant operate at a reduced capacity. Metachem officially closed the facility on May 4, 2002 and declared bankruptcy six days later on May 10, 2002. On May 14, 2003, Metachem officially abandoned the SCD Site to the EPA and the Delaware Department of Natural Resources and Environmental Control (DNREC). Since then, the EPA and DNREC have been cooperating to implement an emergency cleanup action and determine an approach for the long-term rehabilitation of the SCD Site (Black & Veatch, 2003a).

While the SCD facility is no longer an active manufacturing plant, chemical removal/site decontamination activities by EPA and DNREC are currently in progress. As part of these activities, some of the equipment remaining on the Site, including the waste water treatment plant (WWTP) and various items of process equipment are currently being operated by the EPA DNREC, and their respective contractors. The EPA is preparing to shut down the WWTP in early 2004 after the completion of sump and pad cleaning. Runoff from active areas will then be directed to a carbon filtration unit. Additionally, the rail siding located on the western side of the facility (Figure 2) is being utilized during chemical removal efforts. The majority of the removal efforts are estimated to be completed in the Spring of 2004.

1.1.2 Major Documented Facility Related Releases

Three major releases are known to have occurred at the SCD facility during its period of operation:

- In March 1976, a chlorobenzene leak was detected in a catch basin that is part of the WWTP.
- In September of 1981, approximately 5,000 gallons of chlorobenzene were released during the transfer of chemicals to a railroad tank car.
- In January 1986, a tank failure – and related damage to other nearby storage tanks – resulted in the release of approximately 569,000 gallons of various volatile organic compounds (VOCs) including species of di- and trichlorobenzenes.

1.1.2.1 1976 Catch Basin Release

Catch Basin Number 1 (Figure 2) is a settling basin that was used to recover free chlorobenzene product from the facility's wastewater. According to the initial Feasibility Study (FS) performed by Roy F. Weston (1992) this catch basin was repaired by SCD in 1976, but the surrounding soils – in which contamination has been detected – were left in place. Subsequent investigations – conducted following the 1981 chlorobenzene spill – determined that the catch basin leak was the primary source of chlorinated benzene contamination in the groundwater underlying the site (Weston, 1993).

1.1.2.2 1981 Tank Car Spill

The 1981 release occurred on the rail siding located near the western boundary of the SCD facility (Figure 2). Spilled chemicals traveled along the western boundary of the SCD Site and into a drainage ditch that runs westward along Governor Lea Road towards an unnamed tributary of the Red Lion Creek. As part of their response action, SCD recovered a portion of the surface runoff and removed surface soils in the release area and in the drainage ditch located along Governor Lea Road. The excavated soil was shipped to a permitted off-site disposal facility. This removal action was performed under the supervision of DNREC. SCD also conducted a limited subsurface investigation in the area of the release to determine the potential for migration of the spilled chlorobenzene into the underlying groundwater. Based on the results of this investigation, SCD and DNREC concluded that the potential existed for groundwater contamination to occur.

Following these actions, SCD, through its contractor (Weston), conducted additional investigation and assessment activities that included the installation of groundwater monitoring wells at various locations on the SCD property. The sampling and analysis conducted as part of these investigations determined that the groundwater was contaminated with multiple types of chlorinated benzenes. As stated previously, it was subsequently determined that the primary source for the chlorinated benzenes in the groundwater was a leak that SCD had previously detected in the catch basin.

To address the groundwater contamination, SCD installed a series of recovery wells and modified their existing WWTP to include an air stripper. An additional clarifier and tertiary sand filter were added to address the increased flow. A modified National Pollutant Discharge Elimination System (NPDES) permit for the facility was issued by DNREC on January 21, 1985 and the system was brought on-line in 1986 (Weston, 1992).

1.1.2.3 1986 Tank Collapse

The 1986 release involved the failure of a 375,000-gallon tank located near the western boundary of the SCD facility (Figure 2). The spill resulting from the collapse of this first tank damaged three nearby tanks causing additional releases of volatile organic compounds (VOCs). Approximately 569,000 gallons of various VOCs – including paradichlorobenzene and trichlorobenzene compounds – were released during this incident.

A portion of the spilled chemicals from this release solidified on contact with the paved areas of the SCD facility. Much of this material was subsequently recovered for reprocessing by SCD. Some of the spilled chemicals from the 1986 release traveled northward to the northwest corner of the SCD property. From this point, they flowed down the western drainage gully and into a wetland area surrounding an unnamed tributary of the Red Lion Creek. Spilled chemicals from the 1986 release also flowed eastward across paved sections of the SCD property into the eastern drainage ditch. This material then traveled northward until it reached the northern fence line.

As part of the initial response to this spill, SCD constructed a berm and a silt fence across the tributary wetland area. These were constructed to minimize the spread of contaminants into Red Lion Creek. Contaminated sediments were excavated from the wetlands area to the south of the berm and placed in a lined sedimentation basin (Figure 2) that was constructed to the north of the

SCD fence line. Other contaminated materials were placed in soil piles that were constructed to the northwest of the fence line (Weston, 1992).

1.1.3 Regulatory History and Previous Investigations

Following the discovery of the 1981 spill, the SCD Site was assigned a CERCLIS number (DED041212473). Over the course of the three ensuing years, EPA conducted an initial site inspection and a Preliminary Assessment of the SCD Site. The results of these investigations were then used to assemble a Hazard Ranking System (HRS) package that resulted in proposal of the SCD Site to the National Priorities List (NPL) on September 18, 1985. The SCD Site was formally added to the NPL on July 22, 1987 (EPA, 2003).

A Consent Order (between DNREC and SCD) covering the performance of a Remedial Investigation and Feasibility Study (RI/FS) at the SCD Site was signed on January 12, 1988 and amended on November 14, 1988. The initial RI and FS – conducted by SCD to address the spill pathways and off-site contamination – were completed in 1992 and 1993, respectively. The spill RI and the FS are discussed and summarized in reports assembled by the PRP's contractor (Weston, 1992 and 1993). The RI included the following key elements:

- Surface and subsurface soil sampling (site-wide);
- Sampling of soil piles and the sedimentation basin containing contaminated materials excavated after the 1986 release;
- Sampling of new and existing monitoring wells; and
- Surface water and sediment sampling (Red Lion Creek, its unnamed tributary, and the surrounding wetlands).

A Record of Decision (ROD) for the SCD Site was completed on March 9, 1995, and an Administrative Order for Remedial Design and Remedial Action was signed on May 30, 1996. Primary contaminants of concern (COCs) identified in the ROD include:

• Benzene	• Pentachlorobenzene
• Chlorobenzene	• 1,2,3,4-Tetrachlorobenzene
• 1,2-Dichlorobenzene	• 1,2,4,5-Tetrachlorobenzene
• 1,3-Dichlorobenzene	• Toluene
• 1,4-Dichlorobenzene	• 1,2,3-Trichlorobenzene
• Hexachlorobenzene	• 1,2,4-Trichlorobenzene
• Nitrobenzene	• 1,3,5-Trichlorobenzene

The Baseline Risk Assessment and subsequent RD activities have also identified polychlorinated biphenyls (PCBs), metachloronitrobenzene, and dioxins as site-related contaminants (EPA, 1995).

Other undocumented spills/releases may have also contributed to contamination of the facility. However, the current distribution of the contaminants and the original sources of the contaminants are not clearly understood. Consequently, additional COCs might be identified over the course of this RI/FS.

Standard Chlorine of Delaware, Inc. and Metachem, LLC are the Potentially Responsible Parties (PRPs) for the Site. The project is a Superfund-led project.

1.2 Physical Setting and Conditions

1.2.1 Topography and Surface Hydrology

The Site is located on relatively flat land approximately 50 feet above mean sea level (MSL). The terrain within the fence line is relatively flat with the exception of various manmade containment and drainage features. Containment structures surround various storage tank and process areas located within the fence line. The facility's wastewater treatment system currently includes an open catch basin (located near the center of the facility) and shallow drainage ditches which convey runoff to the WWTP through the eastern portion of the facility (approximately two to four ft deep) and along the facility's rail siding (approximately one foot deep). The land between the northern fence line and the Red Lion Creek is wooded with trees typically less than 6 inches in diameter. This area remains undeveloped with the exception of single lane gravel roads, a sedimentation lagoon/basin, two soil piles (containing soil excavated from the unnamed tributary after the 1986 spill), and other features constructed as part of past remedial and monitoring activities. With the exception of the area occupied by Air Products, elevations decrease rapidly to the west of the SCD facility, leveling out to a few feet above MSL in the wetlands surrounding the unnamed tributary of the Red Lion Creek. The area to the north of the facility is relatively flat, but it drops off sharply (to approximately MSL) near the unnamed tributary of Red Lion Creek to the west and as it nears the Red Lion Creek to the north.

Surface water runoff from the facility drains primarily to the east and west. Run-off from the eastern portion of the facility is directed through a drainage ditch – referred to as the eastern drainage ditch in the Record of Decision (ROD) – and eventually passes through a weir before emptying offsite, ultimately into the Red Lion Creek. Run-off from the western side of the facility is captured by a shallow (typically less than one foot deep) drainage ditch from which it is directed off-site and down to the unnamed tributary of the Red Lion Creek via two main drainage features. The first is a drainage ditch that runs along Governor Lea Road south of the Air Products facility. The second is an eroded gully – referred to as the western drainage gully in the ROD – located at the northwestern corner of the facility (Weston, 1992).

1.2.2 Geology

Previous geologic investigations conducted as part of the RI found that the Site is located above the Potomac, Merchantville, and Columbia Formations in the Atlantic Coastal Plain Physiographic Province. The SCD Site is located approximately 12 miles southeast from the Fall Line, which marks the border between the Piedmont Province and the Coastal Plain. In New Jersey and Delaware, the Atlantic Coastal Plain is underlain by a wedge-shaped mass of unconsolidated to

semi-consolidated deposits that rest on crystalline bedrock and thicken toward the Atlantic Ocean. The stratigraphy of the Coastal Plain Province in the area of the SCD Site includes interbedding of fine- and coarse-grained sediments that consist of silt, clay, and sand, with gravel and lignite. The sediments were deposited in marine environment from late Cretaceous through early Tertiary time. Because of shifting between deltaic and alluvial deposition, sediment types and textures can change greatly within short horizontal distances.

The Columbia Formation – consisting largely of fine sand and medium sand and gravel – is the uppermost geologic unit found at the Site and ranges in thickness from approximately 10 to 20 feet in the tributary wetlands to as much as 74 feet beneath the facility and other upland areas of the SCD Site. The Merchantville Formation (ranging in thickness from 0 to 21 feet) underlies the Columbia Formation but was found to be absent from the central portion of the Site in previous investigations. This formation is predominantly composed of material ranging from gray micaceous clay to silty/sandy clay. The upper portion of the Potomac Formation – which underlies the Columbia and Merchantville Formations – consists largely of interbedded clay, silt, and sand and overlies a water-bearing sand unit referred to in the RI Report as the upper Potomac aquifer.

1.2.3 Hydrogeology

Based on the geologic investigations previously performed at the site, the formations known to be present at the site include the Columbia, Merchantville, and Potomac.

The Columbia Formation, the upper-most aquifer at the SCD Site, is a part of a north-south trending channel filled with unconsolidated sand and gravel that includes pockets of silts and clays. Its thickness at the site varies between approximately 25 and 45 feet. The Columbia Formation is underlain by either the Merchantville Formation, which includes dark gray to black, micaceous clay to silty-clay soil, or the top of the Potomac clay. According to previous investigations, the Merchantville Formation may not be present near the center of the site. In these areas, the Columbia aquifer directly overlies the Potomac clays where the Merchantville Formation has been incised. The presence of a continuous clay/silty-clay layer that limits groundwater flow between the Columbia aquifer and the Potomac aquifer at the SCD Site has been suggested by most existing Site data, but boring logs from two borings (SB-41 and TB-41) indicate that this layer might not be continuous. Furthermore, preliminary results from a recent investigation of Potomac aquifer water quality suggest that some transmission occurs between the two formations because of the presence of low level site-related contaminants in the Potomac aquifer.

1.2.4 Soils

The soils underlying the SCD Facility and forested uplands consist primarily of Matapeake silt loam interspersed with small areas of Sassafras sandy loam. In general, these are deep well-drained soils, which are susceptible to erosion on sloping areas. The wetland areas within the site consist of mixed alluvial land and tidal marsh. These soils lack uniform characteristics and are influenced with tidal fluctuations in Red Lion Creek and the Delaware River (USDA, 1970).

1.2.5 Ecological Habitats

The following five ecological habitats – in addition to the industrial facility – have been identified at the SCD Site (CRA, 1999; 2000):

- Red Lion Creek and its unnamed tributary;
- Palustrine Emergent Wetlands;
- Palustrine Open Water;
- Palustrine Forested Wetlands; and
- Deciduous Upland Forest.

This RI/FS – as described in Work Assignment Number 045-RICO03H6 – will be concerned primarily with the industrial facility and the above-listed habitats that are potentially impacted by all migration pathways from source areas at the SCD site. These migration pathways may include surface water runoff, groundwater transmission, and aerial distribution.

Federal and state agencies were contacted during the 1992 RI to determine the potential for threatened or endangered species to be present in the vicinity of the SCD facility. Based on the information acquired, it was reported that there are no threatened or endangered species expected to be present in the vicinity (Weston, 1992). This information will be updated as necessary during the current RI.

1.2.6 Buildings and Facilities

Several buildings and facilities currently exist at the SCD site. The following is a brief description of the extent and condition of the major buildings, storage areas, and process facilities that are included within the facility boundary.

- Warehouse – This building is currently being used to store off products and waste materials recovered by the EPA Emergency Response Team (ERT) and EPA Removal Program Team (RPT).
- Loading area – This area was previously used for loading of product into railcars and tanker trucks. The rail area is currently covered with gravel ballast. The tanker truck loading area consists of a concrete pad located under the off loading piping fixtures. The concrete pad is cracked and stained in multiple locations.
- Lab/office area – This building is generally empty and in an abandoned state. The office areas are temporarily being used by the EPA ERT and RPT personnel.
- Process area – This area contains abandoned process equipment which shows signs of rust and degradation. The equipment is generally located on containment pads. The current conditions of these pads have not been fully investigated.

- Drum cleaning area – This area consists of a small building with an adjacent concrete storage pad where drums were previously stored. The condition of pad appears to be fair although additional investigation is needed for a complete assessment.
- PCB/dioxin concentration area – This area was previously used to transfer off product and PCB/dioxin contaminated materials into drums for subsequent disposal. Additional investigation is necessary to fully assess this area.
- Suspect barren area – This area, located to the north east of the SCD facility, has not been investigated to date. It was located by the JV on an aerial photograph. Based on the aerial, there is an apparent path from the SCD/Metachem property gate on east side of facility which suggests that SCD/Metachem personnel have accessed this area Additional investigation is necessary to fully assess this area.
- Rail siding area – This area is located along west boundary of facility and was previously used for delivery of raw product to the site and shipment of finished product.
- Tank farms – Multiple tank farms exist across the facility. All tanks are located in concrete secondary containment measures. Additional investigation is necessary to fully assess the tank farm areas.

1.3 Purpose and Scope of Work

The purpose of this work assignment is to perform RI/FS activities for the SCD facility and to select a remedy to eliminate, reduce, or control risks to human health and the environment. The purpose and scope of this RI/FS differs from those of previous investigations.

Previous investigation efforts concentrated almost exclusively on those portions of the site that were directly impacted by a leaking WWTP Catch Basin and portions of the spill pathways of the 1981 and 1986 releases. Available data from these earlier investigations also shows that they were primarily concerned with determining the level of VOC and semivolatile organic compound (SVOC) contamination present at the site. In addition, the sampling activities conducted under these earlier investigations were affected by limitations related to the facility's status as an active manufacturing facility. Similarly, an active manufacturing facility scenario was employed when considering the main facility portion of the site in previous risk assessment activities. Finally, the age of data in the original RI/FS and the lack of data points in certain areas (e.g., the northeastern extent of the 1986 spill drainage pathway) call into question the data's usefulness for decision making purposes.

Because the facility is no longer active, sampling activities under this RI/FS will not be limited by manufacturing related activities and more appropriate risk scenarios will be utilized. Furthermore, now that the facility has been abandoned it is necessary to determine whether there are areas outside the previously investigated spill pathways that might be contaminated to the level that they will require remedial actions. Additionally, while previous investigations of the subsurface portions of the site were generally limited in depth and scope, contamination that is contributing to the degradation of the area's groundwater has been identified as deep as 70 feet below ground surface (bgs). This RI/FS will attempt to address the existing data gaps and will provide additional data that

will be used in the screening of remedial technologies (including certain technologies that were unavailable when the previous RI/FS was performed). In addition, the new risk assessment activities will take into account the potential impacts of all of the site's contaminants (not just VOCs and SVOCs).

RI/FS activities associated with the site will consist of the tasks indicated in the EPA SOW. The EPA SOW, dated October 2, 2003, defined the tasks to be included in the RI/FS Work Plan as follows:

RAC Task No.	Descriptions
Task 1	Project Planning and Support
Task 2	Community Relations
Task 3	Data Acquisition
Task 5	Analytical Support and Data Validation
Task 6	Data Evaluation
Task 7	Risk Assessment
Task 8	Treatability Study/Pilot Testing
Task 9	Remedial Investigation Report
Task 10	Remedial Alternatives Screening
Task 11	Remedial Alternatives Evaluation
Task 12	FS Report and RI/FS Report
Task 13	Post RI/FS Support
Task 16	Work Assignment Closeout

These tasks present the approach of collecting the minimum amount of data necessary to support the selection of an approach for site remediation. Some data collected early in the RI fieldwork will be used to help identify the applicability of a presumptive remedy, by providing a justification for reducing the overall scope of sampling.

The JV was authorized to commence work on Task 1 under an Initial Work Assignment Form dated October 2, 2003.

Several tasks; including development of this Draft Work Plan and other planning documents (i.e. Site- and Task-Specific Health and Safety Plans [HASPs], Quality Assurance Project Plan [QAPP], and Field Sampling Plan [FSP]); have been initiated under the initial Work Assignment Form (WAF). The JV attended an initial scoping meeting specific to the SCD RI/FS on October 30, 2003 and a RI/FS technical scoping/approach meeting on November 26, 2003. Minutes from each of these meetings are included in Appendix B. The JV maintained regular contact with EPA technical personnel during the production of this Draft Work Plan. Additionally, monthly progress reports summarizing SCD project related activities were submitted for the October, November, and December billing periods.

2.0 Technical Approach

2.1 Overview

This section of the work plan describes the technical approach to the tasks to be performed under this work assignment in providing technical support to EPA. Work descriptions, where appropriate, indicate the technical approach and assumptions that will impact the estimated LOE the most. The tasks outlined in the EPA's October 2, 2003 work assignment have been incorporated into this work plan under the appropriate tasks described below. The work to be performed under this RI/FS work plan will generally consist of the following tasks:

RAC Task No.	Descriptions
Task 1	Project Planning and Support
Task 2	Community Relations
Task 3	Data Acquisition
Task 5	Analytical Support and Data Validation
Task 6	Data Evaluation
Task 7	Risk Assessment
Task 8	Treatability Study/Pilot Testing
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These task numbers correspond to the EPA work breakdown structure (WBS) for the RAC program for performing Fund-Lead RI/FS activities and provide a manageable and efficient means of budgeting and tracking project activities. These tasks, as described within the EPA SOW, will be performed under Black & Veatch Project Number 047123 as discussed below.

Each task number will be used to account for both expended LOE hours and associated costs for project activities. The specific costs related to this Draft Work Plan are presented as a separate document in Volume 2.

2.2 Task 1 – Project Planning and Support

Project management activities are those planning and support tasks that provide project control and ensure that all project activities are performed according to scope, accurately, efficiently, and on schedule. Black & Veatch commenced project management activities for the SCD RI/FS under this work assignment when it was first issued on October 2, 2003 and will continue as discussed below.

Qualified personnel with appropriate professional backgrounds will be assigned to perform project tasks. Although all reasonable efforts will be made to maintain continuity of personnel throughout this work assignment, the assistance of some technical specialists (e.g., scientists and engineers) is anticipated. The EPA Remedial Project Manager (RPM) will be advised as soon as possible when assistance from technical specialists and other changes to the project team are necessary.

The Black & Veatch Work Assignment Manager (WAM) will maintain project control. The WAM will be responsible for keeping EPA informed of the direction of project work; compliance with schedules and budgets; performance of reviews, content, and format of review comments; and day-to-day monitoring of project staff. The WAM is also responsible for providing EPA with technical, financial, and schedule status reports on a monthly basis throughout the life of the project. The WAM will discuss individual subtasks with the RPM before and after each work event to facilitate consistent and thorough cost control. Informal accounting of LOE and costs will be provided at the request of the RPM for individual task events. If required, the JV can provide summaries of LOE and costs in weekly intervals utilizing a cost accounting and project tracking system.

Quality control (QC) will be carried out in accordance with the Black & Veatch Corporate Quality Assurance Plan and the RAC III contract requirements. Ultimate responsibility for QC rests with the WAM, although various QC personnel will assist the WAM. Specific information regarding QC procedures is contained in Section 4.0 of this work plan.

Subtasks representative of the efforts that will be completed under the project planning and support task include the following:

- Participation in the work assignment scoping meeting and technical scoping meeting(s). This activity includes preparation of meeting presentation and initial RI approach;
- Evaluation of existing site information through coordination with the EPA ERT and EPA RPT. Coordination with ERT and RPT will continue throughout the duration of their activities at the site;
- Development of technical project goals and objectives;
- Development of a draft and final RI/FS Work Plan (including any negotiations);

- Development of a draft and final Site Management Plan (SMP) to address site security and access issues associated with the RI field activities. This SMP will be developed in accordance with the SOW;
- Development of a draft and final HASP (site-specific) to address the RI field activities to be conducted in accordance with the SOW. Additionally, a draft and final task-specific HASP for the site investigation activities will be developed in accordance with the SOW;
- Development of a draft and final Sampling and Analysis Plan (SAP) that will include a FSP to delineate the data collection activities to be performed during the field investigation task, a QAPP to address data quality objectives, and a Data Management Plan (DMP) to address data management and document control for all RI/FS activities;
- Development of a Pollution Control Mitigation Plan (PCMP) to outline procedures and safeguards insuring contaminants are not released offsite during RI/FS implementation (included in the FSP). The PCMP will include the Transportation and Disposal Plan (TDP) (Waste Management Plan) to describe how any wastes that are encountered will be managed and disposed;
- Development of a Risk Assessment Plan (RAP) to determine whether site contaminants of concern pose a current or potential risk to human health and the environment in the absence of any remedial action;
- Procurement and management of all RI-related subcontracts. Activities include identifying potential vendors, conducting bidding process, development of consent package and contract documents, payment of invoices, pre-work meetings, site visits, review of pre-work submissions, and work coordination. Refer to Section 7 of this Work Plan for a list of the expected subcontracts required for this RI/FS;
- Attendance of Work Plan and scope negotiation meeting; and
- Preparation of monthly progress and financial status reports.

Monthly progress reports will continue throughout the project and will summarize the following information in the form of the Technical, Financial, and Schedule Status Reports.

The Technical Status reports will summarize the following:

- Activities during the reporting period;
- Project schedule and progress, including percent LOE and costs expended through the period;
- Schedule variances and corrective actions; and
- Activities planned for the next reporting period.

Financial status reports will summarize the following information:

- Project professional hours and costs expended to date by task;
- Actual project professional hours and expenditures for the given reporting period; and
- Estimated professional hours and costs to complete each task.

Schedule status reports will summarize the following information:

- Project tasks with planned and actual start and completion dates; and
- Planned and actual dates for milestones and submittals.

This work plan contains Project Planning and Support LOE and costs projected through June 11, 2007.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
PROJECT PLANNING AND SUPPORT	1									
-SCOPING AND TECHNICAL APPROACH MEETINGS	1.1	6	30	12	16	0	0	64	6	70
-REVIEW EXISTING DATA	1.2	0	30	30	15	0	0	75	7	82
-DRAFT AND FINAL RI/FS WORKPLAN	1.3	40	80	70	50	0	0	240	22	262
-SMP	1.4	4	16	24	24	0	0	68	6	74
-QAPP	1.5	8	24	64	48	0	0	144	13	157
-DMP	1.6	8	24	56	16	0	0	104	9	113
-FSP/PCMP/TDP	1.7	8	24	36	64	0	0	132	12	144
-HASP	1.8	8	24	16	56	0	0	104	9	113
-RAP	1.9	0	22	34	8	0	0	64	6	70
-PROJECT ADMINISTRATION AND REPORTING	1.10	94	329	47	47	235	0	752	68	820
-TEAM AND SUB-POOL CONTRACT MANAGEMENT	1.11	32	192	120	200	0	0	544	49	593
-ATTEND WORK PLAN NEGOTIATION MEETING	1.12	8	8	0	0	0	0	16	1	17
TASK SUBTOTAL		216	803	509	544	235	0	2307	208	2515

2.3 Task 2 – Community Relations

This task includes contractor support to EPA for activities related to community relations. These activities include attending public hearings and meetings, and providing technical support for EPA presentations and fact sheets.

This task involves preparation of presentation materials for meetings with the concerned public and provision of technical personnel to address technical issues related to RI/FS project efforts and

results. The Black & Veatch WAM will attend and provide visual aid support for up to 10 public availability meetings under this task.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
COMMUNITY RELATIONS	2									
-PUBLIC HEARING, MEETING, AND AVAILABILITY SUPP	2.1	0	130	80	60	0	0	270	24	294
TASK SUBTOTAL		0	130	80	60	0	0	270	24	294

2.4 Task 3 – Data Acquisition

This task will include performing the RI/FS field investigations necessary to collect the data necessary to characterize the nature and extent of contamination at the site and conduct the Human Health Risk Assessment (HHRA) and Ecological Risk Assessments (ERA). Complete details of the field investigation program will be presented in the HASP, SAP (QAPP, FSP, DMP, PCMP, TDP), and the RAP, to be prepared and submitted as deliverables within 21 days of the approval of this RI/FS Work Plan. This task includes efforts to acquire data to support RI/FS activities. Previous RI and RD investigation efforts have focused largely on the spill pathways associated with major documented releases that occurred at the site. There are little or no data available for the SCD facility itself. This RI/FS field investigation will focus primarily on the SCD facility and include limited investigations in the following off-site areas to determine the potential impacts from the site: 1.) wooded area to the north of the facility, 2.) drainage pathways to the east and northeast of the facility, 3.) a suspect barren area to the northeast of the facility, 4.) sediment and surface water in Red Lion Creek and its unnamed tributary, and 5.) groundwater in the Columbia and Potomac aquifers. These areas are presented in Figure 2.

A review of the data generated in the previous RI and RD Investigations along with other site information (site visit, scoping meeting, aerial photography, GIS data, etc.) was used to develop a conceptual model of the site (Figure 3). This conceptual model depicts the suspected source areas of contamination, potential migration pathways for contaminant movement, and potential receptors that may be exposed to these contaminants. This information was used to guide the field sampling activities proposed in this Task. In general, the RI/FS field sampling activities will be conducted to address the following Data Quality Objectives (DQOs) for the SCD site:

- To determine the nature and extent of the contamination;
- To provide data input for development of a HHRA and a ERA;

- To provide data to aid in the screening potential remedial technologies to be used at the site; and

- To provide waste characterization data to assist in determination of appropriate disposal methods for site-related wastes.

In accordance with the SOW, the RI/FS field sampling activities will provide a minimum amount of data necessary to support the selection of an approach for site remediation, if potential risks to human health and the environment are identified. Based on the SOW, the preliminary development of risk assessment goals, and discussions from the scoping and technical meetings, Task 3 – Data Acquisition will consist of the following subtasks:

- Subtask 3.1 Site Mobilization and Demobilization
- Subtask 3.2 Site Reconnaissance
- Subtask 3.3 Geological Investigation
- Subtask 3.4 Air Investigation
- Subtask 3.5 Hydrogeological Investigation
- Subtask 3.6 Waste Investigation
- Subtask 3.7 Geophysical Investigation
- Subtask 3.8 Ecological Investigation
- Subtask 3.9 On-site Building Assessment
- Subtask 3.10 Investigation-Derived Waste Characterization and Disposal

A detailed description of each subtask is provided below.

2.4.1 Subtask 3.1 – Site Mobilization and Demobilization

Site mobilization activities include:

- Staff scheduling and preparation - Activities include review of work and project plans, staffing commitments, and coordination of travel requirements. Equipment and supplies procurement includes the identification of vendors for the rental of field equipment, and vendors of field supplies, including sampling supplies.

- Confirming/obtaining access agreements from adjacent landowners (Air Products, Occidental Chemical, and Motiva) - The start of field activities in those areas is predicated upon the existence of these access agreements. It is anticipated that current access agreements – put in place for Remedial Design (RD) efforts at the site – will be sufficient for the purposes of RI/FS activities. In the event that the existing access agreements expire, are revoked, or are deemed insufficient for the purposes of the RI/FS, it is anticipated that EPA will secure new agreements to cover the RI/FS activities.

- Procurement of equipment and supplies - Activities involve the procurement of materials to be used in sampling efforts to be conducted at the site (e.g., bottleware, personal protective equipment (PPE), sampling pumps, decontamination supplies, waste containers). Subcontractors will be responsible for procurement of materials related to activities such as well construction, sample analysis, boring installation.
- Site setup and Security- Activities include the set up and maintenance of a site office trailer, field laboratory, and storage facilities, portable toilet and trash receptacle, electrical and phone connection, overnight delivery service designation, temporary fence construction, and coordination of 24-hour, seven days per week security arrangements. This task also includes the demobilization of site facilities.
- Demolition – Activities include minimal demolition of buildings and tanks on an as needed basis to complete RI/FS sampling activities.

Site demobilization activities include:

- Site Restoration – This will include the removal of all temporary facilities, site security, and the disconnection of all onsite temporary utilities.

2.4.2 Subtask 3.2 – Site Reconnaissance

The purpose of site reconnaissance is to determine field conditions prior to the start of field work in order to enable field activities to start on time and within schedule and budget. This subtask will include site visits for the purposes of determining sample access conditions and staking out of sample locations. These visits will be necessary as some locations may occur under buildings and/or process equipment. Areas that require demolition to obtain samples will also be determined under the site reconnaissance subtask. An existing topographic survey, performed as part of RD activities, will be utilized for the RI/FS.

2.4.3 Subtask 3.3 – Geological Investigation

The purpose of the geological investigation is to determine the physical and chemical characteristics of the surface and subsurface soil/sediment at the site, thus determining nature and extent of contamination in each media. This subtask will include the following activities:

- Review and compilation of existing surface and subsurface soil data;
- Collection of soil/subsurface samples for use in the HHRA and ERA;
- Collection of soil gas samples for use in the HHRA;
- Advancement of soil borings and collection of subsurface soil samples to characterize the nature and extent of contamination;
- Collection of sediment samples for use in the ecological risk assessment; and

- Excavation of test pits.

2.4.3.1 Existing Surface and Subsurface Soil Data

This subtask will require the compilation of (recent) existing analytical data collected for soil and subsurface data for use in the RI/FS. As part of the RD, Black & Veatch collected sediment and soil samples from various locations across the facility (including the eastern and western drainage ditches) for organic analysis and several soil samples for dioxin analysis. Soil samples were also collected from the Western Drainage Gully (surface and subsurface), the soil piles located to the north of the fence line, and from subsurface locations in the unnamed tributary wetland. Sediment samples were collected from locations throughout the unnamed tributary wetland. In addition, the EPA ERT collected soil and dust samples from various facility locations for dioxin analysis. Surface water samples were collected by Black & Veatch and groundwater samples were collected by both DNREC and Black & Veatch. All existing data will be added to the SCD RI/FS database.

2.4.3.2 Risk Assessment Soil Samples

This subtask will require the collection of samples using surface grab techniques and the advancement of soil borings for use in the HHRA and ERA. Because of the nature of the ground surface within the fence line these samples will be collected with the assistance of a Geoprobe subcontractor (to be determined). Samples will be concentrated in those areas that are known or suspected to have the maximum concentrations of contamination present at the SCD site. The surface soil will be collected from the 0- to 6-inch depth interval for use in the ERA. Subsurface soil will be collected from the 6-inch to 4-foot depth interval for use in the HHRA. Ten locations will be established in onsite areas for the risk assessment samples for a total of 20 samples (one surface and one subsurface at each location). An initial review of existing site information indicates that the areas most likely to indicate the highest contaminant concentrations at the site include the following (Figure 2):

- PCB concentration area;
- Catch Basin #1;
- Western drainage ditch along the railroad tracks;
- Warehouse;
- Drum cleaning area;
- Northern end of eastern drainage ditch;
- Loading area;
- WWTP; and
- Process Area (2).

Four locations will be established in offsite areas for the risk assessment samples for a total of eight samples (one surface and one subsurface at each location). The offsite sample locations include the following areas (Figure 2):

- Suspect barren area to the northeast of the SCD facility;
- Western drainage gully (2); and
- Air Products drainage ditch.

The following two background locations will be established for the risk assessment samples for a total of four samples (one surface and one subsurface at each location):

- Farm located north of Red Lion Creek; and
- SCD office building south of Governor Lea Road.

All risk assessment soil samples (including background) will be analyzed under the EPA Contract Laboratory Program (CLP) for the following constituents: Target Compound List (TCL) organics, Target Analyte List (TAL) inorganics, total organic carbon (TOC), and grain size. In order to include several site-specific chemicals, a flex clause will be necessary for all TCL analyses. This clause enables data users to request minor changes to current analytical methods in order to meet specific field site requirements. The following flex clause constituents will be included in all TCL analyses:

- 1,2,3-Trichlorobenzene
- 1,3,5-Trichlorobenzene
- 1,2,3,4-Tetrachlorobenzene
- 1,2,4,5-Tetrachlorobenzene
- Pentachlorobenzene.

Dioxin analytical results from the ongoing removal and RD-related dioxin sampling will be obtained and incorporated into the risk assessments.

The appropriate number of Quality Assurance/Quality Control (QA/QC) samples (duplicates, field blanks, rinsate blanks, and trip blanks) will also be collected under this subtask in accordance with the site QAPP and FSP. Duplicate samples will be collected at a 10% (of the total samples) frequency per matrix. Field and rinsate blanks will be collected at a frequency of one per day and analyzed for TCL/TAL constituents. A trip blank will be included in all shipments that contain samples for VOC analysis only.

2.4.3.3 Field Screening Soil Samples

This subtask will require the advancement of soil borings and collection of soil samples to determine the nature and extent of the contamination at the site in onsite and offsite areas using field screening techniques. Field screening provides significant cost and time savings over CLP-level analytical results and provides an appropriate level of data quality for determining nature and extent.

The soil borings will be advanced by a drilling and/or Geoprobe subcontractor (to be determined). For the onsite samples, a approximate 200 foot (ft) by 200 ft sampling grid will be established within the fence line and soil samples will be collected at each node within the grid. The sampling grid will be adjusted as necessary to account for access issues and to include areas of suspected high contamination (i.e. drainage ditches). Off-site soil samples will be collected at locations beyond the fence line that are identified as suspected or likely areas of significant contamination. Soil borings will be advanced at 30 onsite locations and 20 off-site locations, for a total of 50 locations. Surface soil samples will be collected from an interval of 0-6 inches bgs at all onsite and selected off-site sample locations. Subsurface soil samples will be collected from all sample locations at five-foot depth intervals beginning at 5 ft bgs and continuing until the clay layer underlying the Columbia Formation is encountered (estimated at 70 ft bgs). A total of approximately 803 nature and extent soil samples (including 81 duplicates) are expected to be collected at the site.

These soil samples will be field screened for the TCL constituents (only) using a field portable gas chromatograph/mass spectrometer (GC/MS) operated by a trained subcontractor. The field portable GC/MS is proposed for this operation because it is capable of providing laboratory quality data (EPA, 1998a) at a substantially lower cost than either CLP or mobile laboratory analytical analysis. The primary drawback to the field GC/MS approach is that the analyses cannot accurately analyze compounds with boiling points greater than approximately 400 ^{o}F (degrees Fahrenheit). This means that certain COCs (chlorinated benzenes with four or more chlorines) will not be detected in these analyses. Historical data indicates that the vast majority of the COC mass at the site consists of benzene and chlorinated benzenes with three or fewer chlorines. In addition, it is expected that most remedial options that would be considered for treatment of less chlorinated and non-chlorinated COCs will also be effective in the treatment of the more chlorinated COCs. Consequently, it is not anticipated that this drawback will significantly impact the determination of nature and extent in the RI.

In addition to the field screening analysis of the soil samples, one sample (plus five duplicates) from each of the 50 soil boring locations will also be collected and analyzed for the full scan TCL/TAL constituents (including the aforementioned flex clause constituents), dioxins, TOC, and grain size under the CLP. These samples will be collected from the depth interval in each boring location that indicates the highest organic vapor reading on a portable photoionization detector (PID). These

additional analyses will provide verification of the field screening method and additional data that will be used in the evaluation of remedial alternatives during the FS stage of this effort.

Lastly, a QA/QC check will be performed on the portable field GC/MS unit at the start of the RI field investigation. A performance evaluation (PE) sample will be analyzed and the results submitted to the Office of Analytical Services and Quality Assurance (OASQA). Additionally, samples will be collected from every other depth interval when the first two borings are advanced for a total of 15 samples (plus two duplicates). These samples will be submitted for analysis of TCL/TAL constituents (including the aforementioned flex clause constituents), dioxins, TOC, and grain size under the CLP at the beginning of the RI field activities. The samples will be analyzed under an expedited turn around time request so that the TCL results can be compared to the fields screening results and any necessary corrective actions can be implemented at the earliest possible juncture. If it is determined that the field GC/MS results do not meet expected quality levels and corrective measures cannot be implemented to address the identified shortcoming(s), CLP analysis will be substituted for the field screening analysis.

2.4.3.4 Sediment Samples

This subtask will require two rounds of the collection of seven sediment samples (plus one duplicate) each from the 0 to 6-inch depth interval using grab techniques to determine nature and extent and to fill data gaps from the existing data set used in the spill ERA. Sediment samples will be collected in the following areas at the site:

- Unnamed tributary wetland to the west of the wooded area north of the facility (2);
- Unnamed tributary wetland to the west of Air Products (1);
- Red Lion Creek wetland to the east (1); and
- Red Lion Creek (3).

Two background sediment locations will be established west of the unnamed tributary near the transmission lines along the border of Red Lion Creek and Motiva Road.

All sediment samples will be analyzed under the CLP for TCL/TAL constituents (including the aforementioned flex clause constituents), dioxin, TOC, grain size, and simultaneous extractable metals/acid volatile sulfides (SEM/AVS). These analyses will provide data input for the HHRA and/or ERA

2.4.3.5 Test Pits

This subtask will require the excavation of test pits in suspect barren area for visualization, sampling, and determination of the presence of waste material in this area. An excavation

subcontractor (to be determined) will excavate test pits and three soil samples (plus one duplicate) will be collected and field screened for nature and extent determination. Based the analytical results and test pit findings, the collection of additional samples may be necessary.

2.4.4 Subtask 3.4 – Air Investigation

The purpose of the air investigation is to determine the physical and chemical characteristics of the airborne contamination associated with the site. The analytical results from surface soil and soil gas samples (collected for the HHRA and ERA) will be used to model the concentration of contaminants that potentially occur in the air at the SCD site.

Coincidental with the collection of risk assessment samples (identified as Subtask 3.3), a soil gas sample will be collected using Summa canisters from each of the risk assessment soil borings for a total of 26 samples (plus three duplicates). These gas samples will be shipped to a CLP laboratory for TCL VOC analysis (including the aforementioned flex clause constituents). The results of these analyses will be used as inputs to air modeling efforts and to aid in the determination of any potential risk from the vapor infiltration of contaminants into structures.

2.4.5 Subtask 3.5 – Hydrogeological Investigation

The purpose of the hydrogeological investigation is to gather the information necessary to support the conceptual site model (CSM) and determine the fate and transport mechanisms of the contamination at the site. This subtask will include the following activities:

- Compilation of existing hydrogeological data;
- Collection of water levels;
- Collection of groundwater samples; and
- Collection surface water samples.

2.4.5.1 Existing Hydrogeological Data

Well inventories and other hydrogeological data will be compiled from several agencies and environmental consultants. Data regarding well construction, geophysical logging, hydraulic characteristics, and static water levels will be compiled and entered into the site database. These data will assist in the development of a conceptual model and create a centralized database for site well data. The following are sources for existing hydrogeologic data:

- DNREC Water Supply Section, Division of Water Resources;
- DNREC Division of Air and Waste Mgt. Site Investigational and Restoration Branch;
- Delaware Geologic Survey will be used to identify the monitoring wells on site and in the surrounding areas; and

- Previous site investigation reports.

2.4.5.2 Groundwater Levels

This subtask will require the collection of static groundwater levels from all of the existing facility wells as well as select monitoring wells located on adjacent facilities (i.e. Motiva, OxyChem, and Air Products). The static water levels will be used to develop a site wide groundwater contour map for the Columbia and Potomac aquifers. The contour maps for the site will be used to evaluate hydraulic gradients, flow direction, and temporal fluctuations when compared to historical data.

2.4.5.3 Groundwater Samples

This subtask will require the collection of groundwater samples from the four existing Potomac aquifer wells and the 64 existing Columbia aquifer wells (plus 8 duplicates) using low-flow parameter stabilization sampling techniques that have been employed by DNREC during prior sampling rounds. The groundwater analytical results will be used to determine nature and extent and as part of the HHRA and ERA. Field sampling techniques consistent with DNREC will help ensure results comparable to previous sampling events.

All groundwater samples will be analyzed under the CLP for TCL/TAL constituents (including dissolved metals and the aforementioned flex clause constituents), TOC, chlorides, alkalinity, and hardness. Water quality parameters that will be measured in the field include pH, temperature, dissolved oxygen, oxidation-reduction potential (ORP), total dissolved solids (TDS), salinity, conductivity, and turbidity.

2.4.5.4 Surface Water Samples

This subtask will require two rounds consisting of the collection of seven surface water samples (plus one duplicate, co-located with the proposed sediment samples) each using grab techniques to determine nature and extent and for use in the ERA. Surface water samples will be collected in the following areas at the site:

- Unnamed tributary wetland to the west of the wooded area north of the facility (2);
- Unnamed tributary wetland to the west of Air Products (1);
- Red Lion Creek wetland to the east (1); and
- Red Lion Creek (3).

Two background surface water locations will be established west of the unnamed tributary near the transmission lines along the border of Red Lion Creek and Motiva Road.

All surface water samples will be analyzed under the CLP for TCL/TAL constituents (including dissolved metals and the aforementioned flex clause constituents), dioxin, TOC, alkalinity, and hardness. Water quality parameters will also be collected which include pH, temperature, dissolved oxygen, ORP, TDS, salinity, conductivity, and turbidity.

2.4.6 Subtask 3.6 – Waste Investigation

The purpose of the waste investigation is to determine the physical and chemical characteristics of the wastes currently stored in onsite tanks, catch basins, the warehouse, and the WWTP. This subtask includes the following activities:

- Review EPA ERT and/or RPT inventory of all known wastes onsite;
- Collect waste samples; and
- Dispose of wastes (not included).

2.4.6.1 Waste Inventory

Based on discussions with EPA RPT personnel, all liquid wastes will be removed from the site prior to the commencement of the RI, and an inventory of all remaining solid and semi-solid wastes will be provided to the JV. This inventory will be reviewed for completeness, and any data gaps will be identified.

2.4.6.2 Waste Samples

Waste samples will be collected from any tanks, totes, or containers that have not been properly inventoried. These samples will be analyzed for and analyzed under the CLP for Toxicity Characteristic Leaching Procedure (TCLP) organics (including VOC, SVOC, and pesticide/PCBs), TCLP metals, British Thermal Units (BTU), and specific gravity so that proper disposal methods can be determined. In addition, samples will be collected from the decommissioned facility WWTP as part of this subtask. It is estimated that approximately 94 samples (plus 10 duplicates) will be collected under this subtask.

2.4.6.3 Waste Disposal

This subtask involves the disposal of waste materials (e.g., excess and off-product; tank bottoms) that remain from the operation of the chemical manufacturing facility. Based on discussions with EPA personnel, no waste disposal activities will be conducted as part of this RI/FS.

2.4.7 Subtask 3.7 – Geophysical Investigation

The purpose of the geophysical investigation is to determine the subsurface characteristics of the clay layer that underlies the surficial (Columbia) aquifer and identify any potential vertical migration pathways for site contamination without relying on costly and time consuming invasive methods. Due lateral lithologic variations of less that 20 ft reported from previous investigations at the site, geophysical methods were selected over standard invasive techniques such as soil borings, direct push soil sampling, and cone penetrometer testing.

In the immediate area of the site, the clay layer generally acts as a protective barrier (aquiclude) between the Columbia aquifer and the deeper Potomac aquifer (a major regional drinking water source). Certain borings previously installed at the site have identified possible disconformities in the contact between the Columbia Formation (sands) and the Merchantville and Potomac Formations (clay layer). These represents possible pathways for vertical migration of dense non-aqueous phase liquid (DNAPL) into the drinking water aquifer underlying the clay.

Geophysical methods will be used to determine the continuity of the clay layer underlying the Columbia Formation by imaging the subsurface conditions with noninvasive surface techniques. The delineation of the confining clay layer will allow for an increased understanding of the fate and transport of the DNAPL and to allow for targeted installation of product recovery wells in the low areas of the clay surface.

Due to the varying surface (i.e. wetlands, facility and woodlands) and varying subsurface conditions at the site, the use of one surface geophysical method may not be adequate to delineate the clay layer. Therefore, geophysics subcontractors have recommended using a combination of investigation techniques and a pilot study to ensure that the chosen methods will work. This subtask would typically include a combination of the following methods:

- Pilot Study;
- Ground Penetrating Radar Survey;
- Electrical Survey; and
- Seismic Survey.

2.4.7.1 Pilot Study

The pilot study would be used to determine the feasibility of selected geophysical methods for the site. For example, the geology of the site may not have a sufficient seismic velocity difference to allow for seismic refraction. Also, signal penetration for ground penetrating radar may not be adequate. Therefore, a short, approximately two-day pilot test using the various techniques will be performed to determine the best method or combination of methods for the various surface conditions at the site (i.e. wetlands, facility area, and woodland).

2.4.7.2 Ground Penetrating Radar

Ground penetrating radar (GPR) uses electromagnetic wave propagation and scattering to image, locate, and quantitatively identify changes in electrical and magnetic properties in the ground. It may be performed from the surface of the earth, in a borehole or between boreholes, from aircraft or satellites. It has the highest resolution in subsurface imaging of any geophysical method, approaching centimeters under the right conditions. Depth of investigation varies from less than a meter to over 5,400 meters, depending upon material properties. Detection of a subsurface feature depends upon contrast in electrical and magnetic properties, and the geometric relationship with the antenna. Quantitative interpretation through modeling can derive such information as depth, orientation, size and shape of buried objects, density and water content of soils, and more.

GPR is an economical method for surveying large surface areas. Surveys can have line spacing as close as 25 ft with continuous data stations along each line. In addition to mapping geologic surfaces, the GPR could identify buried manmade features such as tanks and pipelines that may not be accurately documented. This work would be performed by a subcontractor and would require approximately 5 working days to complete.

2.4.7.3 Electric Geophysical Surveys

There are a number of surface electric geophysical methods the measure voltages or magnetic fields associated with electric currents flowing in the ground. These currents can be naturally occurring or produced by direct contact or electromagnetic induction. The difference in electrical conductivity or resistivity of the sand and clay formations are used to develop a subsurface image (Milsom 1989). These methods are relatively inexpensive and expedite data collection. Using economical electric surveys to pinpoint anomalies in the clay surface for a focused seismic investigation could be a time and cost saving approach. This work would be performed by a subcontractor and would require approximately 5 working days to complete.

2.4.7.4 Seismic Survey

Seismic survey methods that will be employed at the SCD site to study the confining clay layer include reflection and refraction. Seismic reflection is dependent on the acoustic impedance of the target horizons, and refraction is dependent of the velocity difference of the media forming contacts. The pilot study will be conducted to determine which seismic method would be most feasible at the site. As with the GPR methods, seismic methods will be used to quantitatively derive the depth, orientation and thickness of specific target layers (e.g. clay layer). It is anticipated that the primary use of seismic techniques will be to image the wetland and facility areas were the other geophysical methods are not feasible. This work would be performed by a subcontractor and would require approximately 25 working days to complete

2.4.8 Subtask 3.8 – Ecological Investigation

The purpose of the ecological investigation is to collect the data necessary to determine the risk to ecological receptors at the site. This subtask will include the following activities:

- Review of existing Baseline Ecological Risk Assessment (BERA) conducted in July 2003 for the spill pathways to determine data gaps in the Conceptual Site Model (CSM), site habitats, assessment and measurement endpoints, and sample locations; and
- Collection of soil, sediment, surface water, and groundwater samples to fill data gaps.

The data gathered during the ecological investigation will be used to expand the existing BERA as discussed in the sections below.

2.4.8.1 BERA Review

As part of this Work Plan, the July 2003 Draft BERA Revision 0 (referred to herein as the "Spill BERA") was reviewed to determine data gaps in the CSM, site habitats, assessment and measurement endpoints, and sampling media and locations. This BERA is currently being finalized under the RD and will serve as the Final BERA for the spill pathway at the SCD site. As part of the RI/FS process, it is proposed that the Final Spill BERA will be revised and submitted as a facility-wide BERA.

The CSM presented in the Spill BERA identified the spill pathway as the primary source of contamination at the site; therefore, the BERA focused on chlorinated benzenes (only) in surface soil, sediment, and surface water. Given these data gaps, the risk assessment samples collected during the RI will include surface soil, sediment, surface water, and groundwater which will be analyzed for the TCL/TAL constituents (including the aforementioned flex clause constituents) and dioxin as discussed below in Section 2.4.8.2. A revised CSM is presented in Figure 3.

The site habitats (as specified in the Spill BERA) will be expanded to include the SCD facility, wetlands to the northeast, and forested uplands to the north and east. Risk assessment samples will be collected in these areas during the RI field investigation and screened against EPA Region III Biological Technical Assistance Group (BTAG) values to determine if there are additional contaminants of potential concern (COPC) that were not evaluated in the Spill BERA.

It is proposed to use the same assessment and measurement endpoints (as specified in the Spill BERA) and run the same food-chain models using the TCL/TAL/dioxin analytical data collected during the RI field investigation. The proposed assessment and measurement endpoints to be evaluated during the RI are presented in Table 3.

2.4.8.2 Soil, Sediment, and Surface Water Samples

Surface soil, sediment, surface water, and groundwater samples collected as part of Subtasks 3.3 and 3.5 of this Work Plan will be used to support the facility-wide BERA.

2.4.9 Subtask 3.9 – On-site Building Assessment

The onsite building assessment will be limited to identifying contamination in the onsite buildings that would pose a hazard to workers performing RI/FS activities. In general, this subtask will include a screening assessment performed by a subcontractor (to be determined) to determine whether friable asbestos is present at the site and whether actions are necessary to protect workers during the RI/FS. Based on discussions with EPA, it was decided that the presence (or absence) of lead paint and surface contamination would not pose sufficient worker risk to warrant sampling/analysis at this time.

For the purposes of this RI, it will be assumed that the onsite buildings are generally contaminated and most investigation and remedial activities regarding building contamination will be performed at a later date during RD activities.

2.4.10 Subtask 3.10 – Investigation-Derived Waste Characterization and Disposal

The purpose of the investigation-derived waste characterization is to ensure that all wastes are disposed of properly. Investigation-derived wastes (IDW) expected to be produced, and which will be disposed of, during RI/FS field activities include:

- Soil - Drill cuttings will be generated from three different activities - monitoring well installation, test pits, and direct-push sampling in support of the nature and extent investigation. Drill cuttings and excavated soil will be containerized in 55-gallon drums, labeled, and staged onsite for subsequent disposal during the RA activities.

- Water – Water will be produced from a variety of sources during this RI, including equipment decontamination, drilling activities, well development, and groundwater water sampling. All water will be temporarily containerized in labeled 55-gallon drums which will then be emptied into the existing sedimentation basin. The accumulated water in this basin will be treated onsite and discharged to Red Lion Creek (under an existing permit) during the RA activities.

- Trash – Most disposable PPE, sampling supplies, and other trash will be handled as typical solid waste. A dumpster will be mobilized during field activities and staged at the office-trailer site for the duration of field activities. Disposable field equipment, including PPE, sampling implements, and other debris, will be double-bagged and

disposed of as normal solid waste unless visibly contaminated. Those materials that are visibly contaminated will be containerized, labeled, and stored onsite for subsequent disposal during the RA or if possible, decontaminated before disposal as normal solid waste.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
DATA ACQUISITION	3									
-SITE MOBILIZATION/DEMOBILIZATION	3.1	60	32	140	100	0	0	332	30	362
-SITE RECONNAISSANCE	3.2	0	8	32	32	0	0	72	6	78
-GEOLOGICAL INVESTIGATION	3.3	0	196	1722	1076	360	0	3354	302	3656
-AIR INVESTIGATION	3.4	0	4	0	26	0	0	30	3	33
-HYDROGEOLOGICAL INVESTIGATION	3.5	0	32	388	388	388	0	1196	108	1304
-WASTE INVESTIGATION	3.6	0	30	240	240	0	0	510	46	556
-GEOPHYSICAL INVESTIGATION	3.7	0	45	320	0	0	0	365	33	398
-ECOLOGICAL INVESTIGATION	3.8	0	2	8	0	0	0	10	1	11
-ONSITE BUILDING ASSESSMENT	3.9	0	6	0	20	0	0	26	2	28
-INVESTIGATION DERIVED WASTE CHAR/DISPOSAL	3.10	0	0	8	24	0	0	32	3	35
TASK SUBTOTAL		60	355	2858	1906	748	0	5927	533	6460

2.5 Task 4 – Sample Analysis

This task includes the analysis of environmental samples collected during the RI field investigation. Additional details of the sampling program are presented in the SAP. A table presenting the anticipated sample and analytical needs for this project has been summarized in Table 2.

For samples receiving chemical analysis under the CLP, the EPA Office of Analytical Support and Quality Assurance (OASQA) will procure the laboratory, typically using either the OASQA or a CLP laboratory.

A subcontract will be issued for the portable GC/MS unit and operator that will be used for field screening analyses. Additional details related to the screening analyses are presented in Section 2.4.3.4.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
SAMPLE ANALYSIS	4									
-SAMPLE ANALYSIS	4	0	0	0	0	0	0	0	0	0
TASK SUBTOTAL		0	0	0	0	0	0	0	0	0

2.6 Task 5 – Analytical Support and Data Validation

This task includes sample management of the analytical data produced. The efforts to collect, prepare, and ship the environmental samples collected during the field activities are included in the Task 3 - Data Acquisition details, as is the effort associated with preparation and tracking of the sample custody records. The efforts required for the compilation of the custody records along with the bulk of the QC functions associated with these records management activities are also under Task 3 - Data Acquisition.

It is important to note that because the EPA has requested that the data will be managed using the EarthSoft® Environmental Quality Information System (EQuIS), an electronic data deliverable (EDD) that follows the standards established by EPA Region 5 is required. The JV will provide support for the EDD and will coordinate with OASQA to ensure that the contracted laboratories provide EDDs in the required formats. It is important to note that is the responsibility of OASQA to ensure that validated data is transmitted to the JV in the Region 5 EDD format.

This task includes all efforts required to schedule, coordinate, and track the analyses of samples and data validation activities. This will include the completion of Routine Analytical Services (RAS) and Delivery of Analytical Services (DAS) requests, sample projections, and coordination with the OASQA Client Services Team (CST) regarding assignment of laboratory services. This task will support the preparation of all required sample summary and shipping paperwork (including chain-of-custody records), and paperwork corrections. This task will also support QA/QC oversight of the subcontracted mobile laboratory operations.

No data validation support is proposed for laboratory data provided from the OASQA or CLP labs under this work assignment; all data generated from the CLP is expected to be validated by other EPA contractors prior to receipt by the JV.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
ANALYTICAL SUPPORT & DATA VALIDATION	5									
-PREPARE AND SHIP SAMPLES	5.1	0	0	0	0	0	0	0	0	0
-QA/SAMPLE MANAGEMENT/PAPERWORK	5.2	0	34	72	48	0	0	154	14	168
-DATA VALIDATION	5.3	0	0	32	0	0	0	32	3	35
TASK SUBTOTAL		0	34	104	48	0	0	186	17	203

2.7 Task 6 – Data Evaluation

This task includes efforts related to compilation and interpretation of field and analytical data collected during the RI field investigation. A large volume of data already exists. Substantially more will be added during the RI data acquisition tasks. For this reason, EQuIS and the EQuIS/ArcView interface will be used to manage and display project results, and produce maps and illustrations. It is anticipated that preliminary and validated data will be received in various formats and will require different amounts of manipulation to make them useable in the EQuIS database. Data from EQuIS will be utilized for preparing the RI report tables, data mining for significant results, developing presentation level output for public meetings (as necessary) and performing many processing tasks for varying types of analyses.

Data from different sampling events will be compared to see if trends exist for the level of contamination.

2.7.1 Subtask 6.1 – Data Usability

Initially, all data (including field measurements, logs, validated laboratory data, survey data, and other data types) will be evaluated for usability. Data will be flagged if it is not consistent with site conditions and the characteristics of the contaminant. The data in doubt will be further evaluated using references to field data and QC data. Verified anomalies for critical data will be carefully evaluated to determine if further investigation or sampling and testing is required.

2.7.2 Subtask 6.2 – Data Reduction, Tabulation, and Evaluation

Data to be tabulated and formatted includes well logs, water level data, hydrogeologic data, soil, groundwater, surface water and sediment sampling data, and hydrologic data. Data tables, specific to their uses in the RI/FS will be generated for each media of concern.

All analytical data generated during the RI sampling events will be loaded into the EQuIS database. The intent is to use EQuIS as a central depository for all site-related environmental data.

All preliminary data generated by the CLP and EPA laboratories is expected to be reported in Region 5 EDD (or equivalent) format. Although these formats are somewhat compatible with EQuUIS, some effort would typically be required to make this data useable in EQuIS. Additionally, based on our recent project experience, it is expected that some EPA-validated data will also be received in hard copy or another electronic format that is not similar to the Region 5 EDD and therefore incompatible with EQuIS. Additional effort will be required to ensure that this validated data is accurately entered into the database.

All field screening preliminary data will be provided in an Excel spreadsheet format at the time of analysis. This data will be validated by the field GC/MS subcontractor (to be determined) and submitted in the Region 5 EDD format once the sampling effort is completed.

2.7.3 Subtask 6.3 – Modeling

Transport modeling of site-related groundwater contamination is currently being conducted as part of the ongoing RD at the site. This includes modeling to evaluate site characteristics, transport values, etc. Temporal and spatial variations of contaminants in groundwater are being evaluated in reference to known characteristics of the aquifer and contaminants. The data gathered from the existing groundwater models will be utilized as necessary to supplement the HHRA and ERA as part of the RI/FS process.

Additionally, air modeling using surface soil and soil gas data collected as part of activities conducted under Task 3 of this RI/FS will be performed to determine potential hazards associated with the site. The model will be performed under a subcontract and will address exposure due to dust inhalation and potential infiltration of soil gases into occupied building spaces.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
DATA EVALUATION	6									
-DATA USABILITY EVALUATION	6.1	0	56	64	100	0	0	220	20	240
-DATA REDUCTION AND TABULATION	6.2	0	52	220	300	0	0	572	51	623
-MODELING	6.3	4	48	16	24	0	0	92	8	100
TASK SUBTOTAL		4	156	300	424	0	0	884	80	964

2.8 Task 7 – Assessment of Risk

This task consists of a baseline HHRA and a BERA. Risk assessments involve characterizing and quantifying existing and potential risks to human health and the environment if no further remedial action is taken. Appropriate EPA guidance documents listed in the Work Assignment Statement of Work will be followed in performing the risk assessments.

2.8.1 Subtask 7.1 – Baseline Human Health Risk Assessment

The HHRA will be conducted in accordance to guidelines provided in Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual, specifically Parts A, B, C, and most importantly, Part D Standardized Planning, Reporting, and Review of Superfund Risk Assessments (EPA, 1998b).

The risk assessment will include several subtasks, including:

- Data Collection;
- Data Evaluation;
- Exposure Assessment;
- Toxicity Assessment; and
- Risk Characterization.

2.8.1.1 Data Collection

The data collection task will include the compilation and summary all appropriate data collected during the proposed field activities. Digitization of these data into an electronic format for use with the RAGS D tables is included as part of this scope, as well as preliminary statistical analysis. A

conceptual site model and Standard Table 1 (Selection of Exposure Pathways) will be developed as part of this task. A preliminary Table 1 is included in this Work Plan.

2.8.1.2 Data Evaluation

The data evaluation task will include an assessment of the usability of the RI/FS data collected. Once data usability issues are evaluated, the potential chemicals of concern for each media will be selected based on the use of screening criteria (equivalent to carcinogenic screening value of $1x10E^{-6}$ and non-carcinogenic screening value of 0.1) from the September 2001 version (or most recent) of the EPA Region III Risk-Based Concentration (RBC) Tables. Standard Table 2 (Occurrence, Distribution, and Selection of Chemicals of Potential Concern) will be developed as part of this task. Should the data evaluation phase indicate that there is an insufficient quantity of data given the degree of exceedances and the number of chemicals of potential concern, the JV will notify EPA that additional data are necessary to support risk assessment activities.

2.8.1.3 Exposure Estimate

The exposure assessment will include the tasks of identifying potentially exposed populations, identify potential exposure pathways, estimate exposure concentrations, and estimate chemical intakes. Standard Table 3 (Medium-Specific Exposure Point Concentration Summary) and Standard Table 4 (Values Used for Daily Intake Calculations) will be developed as part of this task.

2.8.1.4 Toxicity Assessment

The toxicity assessment task will include the compilation of qualitative and quantitative toxicity information for the Chemicals of Potential Concern, the identification of exposure periods for which toxicity values are necessary, the determination of toxicity values for noncarcinogenic effects, and the determination of toxicity values for carcinogenic effects. Standard Table 5 (Non-Cancer Toxicity Data) and Standard Table 6 (Cancer Toxicity Data) will be developed as part of this task.

All of the inorganic and organic potential chemicals of concern are commonly detected at Superfund sites and are well studied from the risk assessment perspective. Therefore, the toxicity assessment task should be routine using the most updated Health Effects Assessment Summary Tables (HEAST), Integrated Risk Information System (IRIS), and other relevant toxicity references.

2.8.1.5 Risk Characterization

The risk characterization task will include a review of the toxicity and exposure assessments, quantification of risks posed by individual chemicals, quantification of risks posed by multiple chemicals, exposure pathway risk calculation, and uncertainty assessment. Standard Table 7 (Calculation of Non-Cancer Hazards), Standard Table 8 (Calculation of Cancer Risks), Standard

Table 9 (Summary of Receptor Risks and Hazards for Chemicals of Potential Concern), and Standard Table 10 (Risk Assessment Summary) will be developed as part of this task.

The following risk assessment deliverables are proposed as part of the scope of work:

- Interim deliverables, including standard tables, worksheets, supporting information, and confidence and uncertainty assessment;
- Draft Baseline Risk Assessment Report (with draft RI/FS Report); and
- Final Baseline Risk Assessment Report (with final RI/FS Report).

The interim deliverables proposed as part of this scope of work are those identified in RAGS, Part D, Exhibit 3-1 (Interim Deliverables for Each Site) and Exhibit 3-2 (Standardized Risk Assessment Reporting). Interim deliverables will be reviewed and approved by the EPA prior to the submission of the baseline HHRA (EPA, 1998).

2.8.2 Subtask 7.2 – Baseline Ecological Risk Assessment

This subtask involves the revision of the Final Spill BERA (discussed in Section 2.4.8) into a comprehensive facility-wide BERA.

The facility-wide BERA will be conducted using the procedures outlined in the USEPA-ERT "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments", 1997. The CERCLA Ecological Risk Assessment process as outlined in the Process document consists of eight steps and five scientific/management decision points. These steps are:

1. Screening-Level Problem Formulation and Ecological Effects Evaluation
2. Screening-Level Exposure Estimate and Risk Calculation
3. Baseline Risk Assessment Problem Formulation
4. Study Design and Data Quality Objective Process
5. Field Verification of Sampling Design
6. Site Investigation and Analysis Phase
7. Risk Characterization
8. Risk Management

The decision points follow steps 2 - 5, and 8.

A SLERA was completed as part of the Spill BERA conducted in July 2003; however its primary focus was on chlorobenzenes and the habitats surrounding the facility. There have been no ecological investigations conducted at the facility, in the wetlands to the north and east of the facility, and in the forested upland north of the facility. Furthermore, the groundwater-to-surface water interface was not evaluated. Given these data gaps from the Spill BERA, it will be necessary to collect additional samples to evaluate the full scan of TCL/TAL constituents (including the aforementioned flex clause constituents) and dioxin as COPCs. These additional samples will be screened against EPA Region III BTAG values to characterize any additional potential COPC and habitats. Groundwater analytical results will be screened against surface water Region III BTAG values to determine the risks related to the discharge of groundwater to surface water. This screen will be provided to EPA in the form of a ERA Technical Memorandum which will identify any additional COPC to those already identified in the Spill BERA. Any additional COPC identified though the samples collected as part of this Work Plan will be evaluated using the seven Assessment and Measurement Endpoints identified in Table 3.

The Spill BERA will be revised to address these additional COPCs and the additional habitats evaluated as part of this investigation and a comprehensive Facility-wide BERA will be submitted as part of the RI/FS process.

The Draft and Final Facility-wide BERA will be submitted as separate deliverables under this subtask.

The EPA RPM and their technical staff typically perform risk management activities. Risk management decisions will be documented and presented as part of the Feasibility Study.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
RISK ASSESSMENT	7									
-DRAFT & FINAL HUMAN HEALTH RISK ASSESSMENT	7.1	16	120	220	80	0	0	436	39	475
-DRAFT & FINAL BASELINE ECOLOGICAL RISK ASSES	7.2	8	40	160	80	0	0	288	26	314
TASK SUBTOTAL		24	160	380	160	0	0	724	65	789

2.9 Task 8 – Treatability Study and Pilot Testing

This task is limited to those technologies that may be suitable for remediation of subsurface soil and groundwater contamination present at the site. It is anticipated that technologies already proposed to address sediment contamination in the nearby wetland areas will be sufficient to address any other COPC identified in the HHRA or ERA. Activities under this task will include a literature search to

identify vendors and additional technologies and development of Draft and Final Treatability Study Work Plans for bench-scale and pilot-scale tests. Subtasks for conducting bench-scale and pilot-scale treatability studies and development of a Treatability Study Report are not anticipated for the purpose of this work plan but may be added in the future.

Based on a preliminary review of remedial alternatives and discussions with EPA, it appears that in-situ thermal treatment technologies might have potential application at this site. Alternatives that are currently under consideration include conductive heating and subsurface steam injection. These technologies would be applied to address areas where accumulations of DNAPL have been identified. Because the technologies have limited radii of influence, they will not be effective unless the locations of DNAPL accumulations are accurately identified. Another potential drawback of in-situ thermal treatment technologies is the possibility that heating of DNAPL could result in the spread of any concentrated DNAPL pools.

2.9.1 Subtask 8.1 – Literature Search and Treatability Study Work Plans

Treatability Study Work Plans will be developed for one bench-scale study and one pilot-scale study. Additional work plans may be added as additional treatment technologies are identified for application. The Treatability Study Work Plans will describe the technology to be tested, test objectives, data quality objectives, test equipment and/or systems, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety procedures, and residual waste management. The pilot test work plan will also describe pilot system installation and startup, operation and maintenance procedures, and operating conditions to be tested. Permitting requirements will be addressed if testing is to be performed offsite. The work plans will include schedules with specific dates for each task and subtask of the treatability studies. The work plans will also describe the treatment process and how the proposed vendor or technology will meet the performance standards for the site. The plans will address how the contractor will meet all discharge or disposal requirements for any and all treated material, air, water, and expected effluents of the study system and will explain the proposed final treatment and disposal of all material generated by the proposed treatment system.

2.9.2 Subtasks 8.2 through 8.4

The budgeting of efforts to conduct any treatability study will be deferred until more information is known about the selected treatability options and vendors.

It is anticipated that three copies of the Draft Treatability Study Work Plan and three copies of the Final Treatability Study Work Plan will be furnished to EPA. An additional copy of each document will be furnished to DNREC.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
TREATABILITY STUDY/PILOT TESTING	8									
-LITERATURE SEARCH AND WORKPLAN	8.1	8	56	32	48	0	0	144	13	157
-BENCH SCALE STUDY	8.2	0	0	0	0	0	0	0	0	0
-PILOT SCALE STUDY	8.3	0	0	0	0	0	0	0	0	0
-TREATABILITY STUDY REPORT	8.4	0	0	0	0	0	0	0	0	0
TASK SUBTOTAL		8	56	32	48	0	0	144	13	157

2.10 Task 9 – Remedial Investigation Report

This task includes evaluation of RI data and formulation of investigation conclusions. The RI report shall provide the information needed to assess risk to human health and the environment, and to support the development, evaluation, and selection of appropriate response alternatives. The RI report shall be prepared in accordance with "Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA" as well as OSWER Directive 9355.3-01, October 1988, Interim Final and "Guidance for Data Usability in Risk Assessment" (EPA/540/G-90/008, September 1990). The RI report shall include a discussion of the following:

- Site Background
- Field Investigation and Technical Approach
- Chemical Analysis and Analytical Methods
- Field Methodologies
    - Surface Water/Sediments
    - Monitoring Well Installation
    - Groundwater Sampling
    - Hydrogeologic Investigations
    - Biological Assessment
    - Air Sampling
    - Soil Boring
- Site Characteristics
    - Geology
    - Hydrogeology
    - Meteorology
    - Demographics and Land Use
    - Ecological Assessment
- Nature and Extent of Contamination
    - Contaminant Sources
    - Contaminant Distribution and Trends

- Fate and Transport
  - Contaminant Characteristics
  - Transport Processes
  - Contaminant Migration Trends
- Summary and Conclusions

Subheadings will be added and/or expanded as needed to reflect the complexity of findings and new information. The HHRA and ERA will be summarized in the RI Report and included as appendices. It is anticipated that three copies of the Draft RI Report (including appendices) and 11 copies of the Final RI Report (including only those changes to the appendices that resulted from the review of the draft report) will be furnished to EPA together with an electronic file copy (PDF format). An additional copy of each document will be furnished to DNREC.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
REMEDIAL INVESTIGATION REPORT	9									
-DRAFT RI REPORT	9.1	16	48	160	48	56	0	328	30	358
-FINAL RI REPORT	9.2	8	28	40	16	16	0	108	10	118
TASK SUBTOTAL		24	76	200	64	72	0	436	39	475

2.11 Task 10 – Remedial Alternatives Screening

This task will involve work efforts to develop and screen remedial alternatives for the site. Remedial alternatives will be developed and screened for soil, groundwater, surface water, and sediment at the site in accordance with the National Contingency Plan (NCP) and the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (OWSER Directive 9355.3-01, October 1988). Other appropriate OWSER directives and EPA guidance will be consulted during this task including the Soil Screening Guidance User's Guide (OSWER 9355.4-23, EPA/540/R-96/018, July 1996). Hazardous waste management alternatives investigated shall include only those alternatives that will remediate or control contaminated media at the site as deemed necessary in the RI, to provide adequate protection of human health and the environment. The alternatives shall include at a minimum a no-action alternative and an in-situ treatment alternative. The following items will be included in the remedial alternatives screening effort:

- Development of remedial action objectives (RAOs). RAOs will be developed to address contaminated soil, groundwater, and sediment at the site. The RAOs will address the

contaminants and media of concern, exposure routes and receptors, and the preliminary remediation goals.

- Development of general response actions. General response actions will be developed to satisfy the RAOs for the soil, groundwater, surface water, and sediment.

- Identification and screening of remedial technologies and process options. Technologies and process options will be identified for each general response action. Technologies and process options will be evaluated based on effectiveness, implementability, and costs. Those technologies showing promise for application at the site but requiring treatability studies prior to implementation will be identified.

- Development of remedial alternatives. Alternatives for the cleaning up all affected media will be developed from the technologies and process options passing the screening in accordance with Section 300.430(e) of the NCP.

- Screening of remedial alternatives. The developed alternatives will be screened against the short- and long-term aspects of effectiveness, implementability, and cost.

The results of the remedial alternatives screening effort will be presented to EPA in the Draft and Final Remedial Alternatives Screening Technical Memoranda.

It is anticipated that three copies of the Draft and Final Remedial Alternatives Screening Technical Memoranda will be furnished to EPA. An additional copy of each document will be furnished to DNREC.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
REMEDIAL ALTERNATIVES SCREENING	10									
-DRAFT RA SCREENING MEMORANDUM	10.1	8	120	48	24	0	0	200	18	218
-FINAL RA SCREENING MEMORANDUM	10.2	4	32	30	16	0	0	82	7	89
TASK SUBTOTAL		12	152	78	40	0	0	282	25	307

2.12 Task 11 – Remedial Alternatives Evaluation

This task typically will include the efforts to perform an evaluation of the remedial alternatives passing the screening performed in Task 10. Guidance to be used will include that provided in the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (OSWER

Directive 9355.3-01, October 1988) and other pertinent OSWER guidance. The nine NCP evaluation criteria are:

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction in toxicity, mobility, and volume through treatment;
- Short-term effectiveness;
- Implementability-technical and administrative;
- Cost;
- State acceptance - to be addressed by EPA Region III in the Proposed Plan and/or the ROD; and
- Community acceptance - to be addressed by EPA Region III in the ROD following the public comment period.

A detailed technical description of each of the alternatives will be prepared. Each description will outline the waste management strategy involved, identify the key ARARs associated with each alternative, and provide a discussion that profiles the performance of that alternative with respect to each of the first seven of the nine NCP evaluation criteria (40 CFR Part 300, March 8, 1990). The last two criteria, state acceptance and community acceptance will be addressed by EPA Region III in the Proposed Plan and/or Record of Decision (ROD). The results of the individual alternative evaluations will be summarized in a table.

After the individual assessment is completed, the alternatives will be compared and contrasted to one another with respect to each of the evaluation criteria. The analysis will be performed in accordance with the NCP and EPA guidance for conducting an RI/FS.

It is anticipated that three copies of the Remedial Alternatives Evaluation will be furnished to EPA. An additional copy will be furnished to DNREC.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
REMEDIAL ALTERNATIVES EVALUATION	11									
-PREPARE RA EVALUATION	11.1	8	80	48	40	0	0	176	16	192
TASK SUBTOTAL		8	80	48	40	0	0	176	16	192

2.13 Task 12 – Feasibility Study Report

This task will include preparation of the Draft and Final Feasibility Study (FS) Report consisting of a detailed analysis of alternatives and cost-effectiveness analysis in accordance with Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (OWSER Directive 9355.3-01, October 1988) and the NCP (300.68(h)(3)(i)(2), March 8, 1990). The feasibility study report will contain the following: 1) a summary of alternative remedial actions in accordance with Chapter 3, NCP 300.68(h)(3)(i)(2)(A); 2) cost analysis in accordance with Chapter 7, NCP 300.68(h)(3)(i)(2)(B); 3) institutional analysis in accordance with Chapter 4, NCP 300.68(h)(3)(i)(2)(C); 4) public health analysis in accordance with Chapter 5, NCP 300.68(h)(3)(i)(2)(D); and 5) environmental analysis in accordance with Chapter 6, NCP 300.68(h)(3)(i)(2)(E). The final FS report will incorporate EPA comments on the draft report. The FS report will include the following information:

- Executive summary;
- Summary of background information for the site;
- Feasibility study objectives;
- Remedial action objectives;
- Presentation of the general response actions;
- Identification and screening of remedial technologies and process options;
- Development and descriptions of remedial alternatives with specific attention given to the study of any problems that may prevent a remedial alternative from mitigating site problems;
- Detailed analysis of remedial alternatives against the seven criteria;
- Comparative analysis of remedial alternatives against the seven criteria; and
- Summary and conclusions.

It is anticipated that three copies of the Draft FS Report and 11 copies of the Final FS Report (including one unbound copy) will be furnished to EPA together with an electronic file copy (PDF format). An additional copy of each document will be furnished to DNREC.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
FEASIBILITY STUDY REPORT	12									
-DRAFT FS REPORT	12.1	20	160	70	48	40	0	338	30	368
-FINAL FS REPORT	12.2	6	60	36	24	16	0	142	13	155
TASK SUBTOTAL		26	220	106	72	56	0	480	43	523

2.14 Task 13 – Post RI/FS Support

This task includes work efforts in support of the EPA's preparation of the ROD for the site. The activities included in this task are as follows:

- Attendance at technical meetings or briefings to be held at the EPA offices;
- Prepare presentation materials;
- Provide any technical assistance that may be necessary in the preparation of the Responsiveness Summary;
- Provide any technical assistance that may be necessary in the preparation of the Proposed Plan and ROD; and
- Prepare the Feasibility Study Addendum should one be necessary.

In accordance with discussions with EPA, no hours have been included in the estimate for any technical assistance or other assistance at this time.

2.15 Task 14 – Negotiation Support

This task was not included in the SOW for this project and will not be used.

2.16 Task 15 – Administrative Record

This task was not included in the SOW for this project and will not be used.

2.17 Task 16 – Work Assignment Closeout

Work assignment closeout functions will be performed under this task when directed by the EPA RPM. Closeout functions include the return of any borrowed documents to EPA, consolidation of the project records, and preparation of project file for archiving/storage, as well as administrative, technical, and financial closeout, including minimal photocopying and duplicating, file indexing, microfilming of project files, etc. A work assignment completion report (WACR) will also be prepared.

Labor Breakdown by Subtasks

TASK DESCRIPTIONS	Task #	P-4	P-3	P-2	P-1	T-2	T-1	TOTAL LOE	CLERICAL	TOTAL LABOR
WORK ASSIGNMENT CLOSE OUT	16									
-FILE DUPLICATION, STORAGE	16.1	0	8	0	20	0	0	28	3	31
-PREPARE WACR	16.2	4	12	0	0	0	0	16	1	17
TASK SUBTOTAL		4	20	0	20	0	0	44	4	48

3.0 Safety and Contingency Plan

A Site-Specific HASP will be prepared for the remedial investigation, along with a Task-Specific HASP to address the site health and safety requirements for the field investigation activities for this project. The HASPs will be prepared as part of the Project Planning and Support task deliverables. Health and safety issues will be addressed in these HASPs in compliance with Black & Veatch's "*Corporate Health and Safety Manual for Hazardous Waste Site Investigations*" and "*Focus on Safety and Health*" and will reference site-specific health and safety criteria to be implemented and procedures to be followed for the pertinent field activities.

As with any remedial planning project, problems and issues do arise that must be resolved in order to complete the project in a timely manner. The following contingency plan has been developed to address such areas of concern. Several potential issues have been listed to demonstrate how these issues will be addressed during the course of the work assignment. While this list is not all-inclusive of the problems or issues that may arise, it offers guidance on how such areas of concern will be handled.

Potential Issue	Response
Subtask elements of this work assignment that have not been fully scoped at this time.	Commence work efforts and revise the work plan and cost estimates in a timely manner for negotiations with the EPA.
Changes in program functions.	Consult with EPA RPM, and Black & Veatch program personnel, as appropriate, and incorporate new guidance into project deliverables.
Scheduled RI work does not detect all "contaminated areas."	Work with EPA RPM to scope additional efforts in a timely manner.
Access to areas proposed for field activities is not granted in a timely manner or refused.	Work with EPA RPM to adjust the field data collection program in a timely manner so as to minimize the adverse impact to field activities.
Community objections to approach or to the Proposed Work Plan.	Work with EPA RPM to prepare alternative recommendations or support efforts to justify actions to the community, or both.
Data to be used to perform the risk assessment or to screen remedial alternatives are not suitable for intended use.	Work with EPA RPM to quickly scope a revised work effort to collect usable data.

4.0 Quality Control Measures

Work activities on this assignment will be conducted in accordance with the procedures defined in the RAC Contract requirements and the Black & Veatch Corporate Quality Assurance (QA) Plan. The Black & Veatch QA Plan defines the authority, responsibilities, and procedures for quality control (QC). The quality assurance review team assembled for each specific task of this assignment will review all major deliverables. The comments of the review team will be incorporated into deliverables before submission to the EPA. This procedure should expedite the EPA's review of submittals by ensuring technical quality of both draft and final deliverables.

The Black & Veatch QA/QC manager will be responsible for the management and performance of our internal review process. The QA/QC manager will also audit work performed in conjunction with this work assignment. The results of any audits performed on this work assignment will be submitted to our RAC 3 program manager with copies provided to the EPA RPM. The audit report will contain a brief description of the audit; identification of compliance status, problems, and non-conformance; and analysis of corrective action status if appropriate.

The Black & Veatch WAM is responsible for the quality control activities for this work assignment. The WAM is responsible for verifying that the work meets the QA requirements associated with the assignment and will maintain the project quality control reports and reviews. The WAM, in conjunction with the Black & Veatch QA manager, will appoint a review team leader (RTL) for the deliverables to be submitted as part of this work effort.

QC personnel, as necessary, will consist of an independent reviewer, project reviewer, and a flexible, multi-disciplinary review team able to provide input in their areas of specialization. Unless specified herein, independent review of deliverables will be conducted to ensure they are accurate, easy to understand, and free of typographical and mathematical errors. As necessary, the project reviewer will participate in both project planning and review of deliverables. The project reviewer may also provide input at meetings or telephone conferences arranged to discuss review comments. Review of deliverables will ultimately be at the discretion of the WAM and always in response to specific requests by the EPA RPM.

All records and reviews will be maintained in accordance with the Black & Veatch QA Plan by the WAM. Listed below are the review requirements for the work assignment deliverables. These requirements also comply with the Black & Veatch Corporate QA Plan.

Document/Deliverable	Discipline Review	Project Review	Independent Review
Site Visit Report	O	R	O
RI/FS Work Plan	O	R	R
Health and Safety Plan (s): Site- and Task-Specific	O	R	R
Quality Assurance Project Plan	O	R	R

Document/Deliverable	Discipline Review	Project Review	Independent Review
Field Sampling Plan	O	R	R
Data Management Plan	O	R	R
Pollution Control and Mitigation Plan	O	R	R
Transportation and Disposal Plan	O	R	R
Risk Assessment Plan	O	R	R
Screening-Level Ecological Risk Assessment (Steps 1 through 3a)	R	R	R
Draft Community Involvement Plan	O	R	R
Final Community Involvement Plan	O	R	O
Fact Sheets	O	R	R
Data Evaluation Summary Report	O	R	R
Draft Human Health Risk Assessment Report	O	R	R
Final Human Health Risk Assessment Report	O	R	O
Draft Ecological Risk Assessment Report	O	R	R
Final Ecological Risk Assessment Report	O	R	O
Draft Treatability Work Plan	O	R	R
Final Treatability Work Plan	O	R	O
Draft Treatability Study Evaluation Report	O	R	R
Final Treatability Study Evaluation Report	O	R	O
Draft Remedial Investigation Report	O	R	R
Final Remedial Investigation Report	O	R	O
Draft Remedial Alternatives Technical Memorandum	O	R	R
Final Remedial Alternatives Technical Memorandum	O	R	O
Remedial Alternatives Evaluation	O	R	R
Draft Feasibility Study Report	O	R	R
Final Feasibility Study Report	O	R	O
NOTE:O = Optional Review R = Required Review			

4.1 Quality Assurance Project Plan (QAPP)

A QAPP will be prepared in accordance with EPA QA/R-5. The QAPP will summarize the quality assurance and quality control objectives and protocols utilized to achieve the Data Quality Objectives (DQOs) at the site.

4.2 Data Management Plan (DMP)

The elements of a DMP will be prepared to define the procedures that will be used to track, store, and retrieve data and will also identify the software to be used, minimum data requirements, data format, and backup data management. The DMP will address both data management and document control for the RI/FS activities described in the SOW for the investigation. An EQuIS database will be used to store all information related to the site investigations at the SCD site.

5.0 Project Milestones

5.1 Project Schedule

The project schedule will generally follow the schedule outlined in the SOW for this work assignment in terms of the order in which deliverables are to be submitted. Deliverable dates for document review comments and other support services will be based on individual documents and agreed to by both the EPA RPM and the Black & Veatch WAM. Figure 4 presents the proposed project schedule. The table in Section 5.2 illustrates the proposed project schedule in tabular form for this work assignment.

5.2 Project Deliverables

Specific project deliverables as defined in the SOW along with the projected dates of submission and the number of copies to be submitted are presented below and on the following page.

Other project deliverables that require EPA input or approval but that are not specifically called out in the SOW table of deliverables are as follows:

- Monthly status reports including financial as well as performance information;
- Responses to comments from EPA review of documents scheduled as deliverables;
- Management procedures necessary for evidentiary considerations; and
- Interim deliverables for HHRA.

Project Deliverable	Projected Date of Submission	Number of Copies[1]
Draft RI/FS Work Plan	January 5, 2004	3
Final RI/FS Work Plan	14 days after receipt of EPA comments	3 bound, 1 unbound
Draft SMP	January 26, 2004	1
Final SMP	14 days after receipt of EPA comments	1 bound, 1 unbound
Draft Site-and Task-Specific HASPs	January 26, 2004	2
Final Site- and Task-Specific HASPs	14 days after receipt of EPA comments	2 bound, 1 unbound
Draft SAP (including FSP, QAPP, DMP, PCMP, and TDP)	January 26, 2004	4
Final SAP (including FSP, QAPP, DMP, PCMP, and TDP)	14 days after receipt of EPA comments	3 bound, 1 unbound
Data Evaluation Summary Report	14 days after receipt of all analytical results from laboratory	3

Project Deliverable	Projected Date of Submission	Number of Copies[1]
Draft Human Health Risk Assessment Report	60 days after receipt of all analytical results from laboratory	3
Final Human Health Risk Assessment Report	14 days after receipt of EPA comments	3 bound, 1 unbound
Draft Ecological Risk Assessment Report	60 days after receipt of all analytical results from laboratory	5
Final Ecological Risk Assessment Report	21 days after receipt of EPA comments	5 bound, 1 unbound
Draft Treatability Study Work Plan	To Be Determined (45 days after tasked by EPA)	3
Final Treatability Study Work Plan	14 days after receipt of EPA comments	2 bound, 1 unbound
Draft Treatability Study Evaluation Report	30 days after completion of Treatability Study	3
Final Treatability Study Evaluation Report	14 days after receipt of EPA comments	2 bound, 1 unbound
Draft Remedial Investigation Report	In accordance with Final RI/FS schedule	3
Final Remedial Investigation Report	30 days after receipt of EPA comments	10 bound, 1 unbound
Draft Remedial Alternatives Technical Memorandum	In accordance with Final RI/FS schedule	3
Final Remedial Alternatives Technical Memorandum	14 days after receipt of EPA comments	3
Remedial Alternatives Evaluation	In accordance with Final RI/FS schedule	3
Draft Feasibility Study Report	45 days after Remedial Alternatives Evaluation submittal	3
Final Feasibility Study Report	30 days after receipt of EPA comments	10 bound, 1 unbound

[1] Note: One additional copy of all major submittals will be sent directly to the DNREC Project Manager.

6.0 Cost Estimate

The estimated project budget is based on projected LOE hours and other cost considerations. Volume 2 of this work plan provides a detailed cost estimate by task and subtask for the activities anticipated for the interim work plan phase of the RI/FS along with the assumptions used to compile these estimates.

7.0 Subcontractors/Consultants

The services of several subcontractors may be required based on the present scope of work. Subcontractors that will be solicited by competitive bidding and used to perform various services for this assignment under either lump sum (LS) contracts with unit price adjustments or unit price (UP) contracts, are listed below:

Activity	Procurement	Contract Type
Drilling/Geoprobe/Test Pit subcontractor	Competitive bid	LS
Geophysical investigation subcontractor	Qualification-based selection	Negotiated
Air modeling subcontractor	Qualification-based selection	Negotiated
Demolition subcontractor	Competitive bid	LS
Asbestos investigation subcontractor	Qualification-based selection	LS
Field GC/MS subcontractor	Sole Source	LS
Site Security	Qualification-based selection	Negotiated

Team contracting will be coordinated through the EPA RPM and the EPA Contracting Officer to ensure that all contract requirements are satisfied. If qualified small business enterprise (SBE)/small disadvantage business enterprise (SDBE)/woman-owned business (WOB) contractors or equipment suppliers are available in the vicinity of the site, they will be afforded every opportunity to participate in the solicitation for the above services. The intent of Black & Veatch at this time is to use qualified SBE/SDBE/WOB contractors for those services to be procured outside of the team members' capability, providing they are cost effective. Black & Veatch will supervise and manage all subcontracted services and monitor their performance for compliance with the SOW and the RAC 3 contract.

8.0 Exceptions to Assignment, Anticipated Problems, and Special Requirements

Based on discussions with the EPA On-Scene Coordinator it appears possible that the agreement covering the removal of process equipment and demolition of associated structures could cause delays in sampling activities. Data gathering activities in some areas might have to be postponed until after demolition and equipment removal operations have been completed. Similarly, sampling of areas that are being used for storage of chemicals awaiting disposal might have to wait until disposal is completed. An RD is currently underway at the site and once the design is finalized and the implementation of the remedial action (RA) begins, RA activities could interfere with RI field activities. Scheduling of treatability studies could be impacted by the fact that there are only a limited number of vendors currently available for certain treatment technologies that are currently under consideration for use at the facility. It is possible that scheduling conflicts, staffing issues, and general responsiveness on the part of a specific vendor could have a substantial negative impact on any proposed treatability study schedule. Delays in the treatability study schedule could negatively impact the completion of the Remedial Alternatives Screening, Remedial Alternatives Evaluation, and Feasibility Study Tasks. Similarly, delays or availability conflicts on the part of the field portable GC/MS service provider could impact the RI schedule due to the fact that only one qualified service provider has been identified that is experienced in the use of this technology for soil investigation applications.

Currently, there are no other anticipated exceptions, problems, or special requirements associated with this work assignment as covered by this budget. If unforeseen factors arise, or if the current scope of work is changed, adjustments will be made to accommodate those changes. It is understood that such changes require the approval of the EPA contracting officer.

9.0 References

ASTM D5777. Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation. American Society for Testing and Materials, May 2000.

Black & Veatch, 2003a. Soil/Sediment Design Comparison Study, Standard Chlorine of Delaware, Inc. Site New Castle County, Delaware. Black & Veatch Special Projects Corporation, June 2003.

CRA, 2000. Work Plan for Site Investigation, Step 4 of Ecological Risk Assessment, Standard Chlorine of Delaware Superfund Site. Conestoga-Rovers & Associates, March 2000.

CRA, 1999. Re-Evaluation of the Ecological Risk Assessment, Steps 1 and 2, Screening-Level Assessment, Standard Chlorine of Delaware Site. Conestoga-Rovers & Associates, March 31, 1999.

EPA, 1995. Record of Decision, Standard Chlorine of Delaware Site, EPA, March 9, 1995.

EPA, 1998a. Environmental Technology Verification Report, Field Portable Gas Chromatograph/ Mass Spectrometer – Inficon, Inc. Hapsite. National Exposure Research Laboratory. EPA/600/R-98/142. November 1998.

EPA, 1998b. Risk Assessment Guidance for Superfund: Volume I, Human Health Evaluation Manual, Part D Standardized Planning, Reporting, and Review of Superfund Risk Assessments. January 1998.

Milsom, 1989. Field Geophysics. Geological Society of London Handbook, John Milsom, pp. 72 - 119. 1989.

USDA. U.S. Department of Agriculture. Soil Survey. New Castle County Delaware. pp. 31, 37, and 38. October 1970.

Weston, 1992. Remedial Investigation Report for the Standard Chlorine of Delaware Site, Delaware City, Delaware, Volume I and Volume II. Roy F. Weston, Inc., September 1992.

Weston, 1993. Feasibility Study Report for the Standard Chlorine of Delaware Site, Delaware City, Delaware. Roy F. Weston, Inc., May 1993.

Tables

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
Standard Chlorine of Delaware Site

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Soil	Surface Soil	SCD Facility	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
						Ingestion	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
						Ingestion	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
						Ingestion	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
			Wetlands	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
						Ingestion	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
						Ingestion	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
						Ingestion	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
			Upland Forested Areas	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
						Ingestion	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
						Ingestion	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
						Ingestion	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
Current	Soil	Subsurface Soil	SCD Facility	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
						Ingestion	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
						Ingestion	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
						Ingestion	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
			Wetlands	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
						Ingestion	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
						Ingestion	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
						Ingestion	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
			Upland Forested Areas	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
						Ingestion	On-site	Quant	Workers are likely to be exposed druing remedial/cleanup activities on site.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
						Ingestion	On-site	Quant	Construction workers may be exposed to contaminants in the subsurface while performing excavation and construction activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
						Ingestion	On-site	Quant	Trespassers are likely to be exposed while traversing the site.
Current	Surface Soil	Particulates	SCD Facility	Industrial Worker	Adult	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
				Construction Worker	Adult	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
			Wetlands	Industrial Worker	Adult	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
				Construction Worker	Adult	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
			Upland Forested Areas	Industrial Worker	Adult	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
				Construction Worker	Adult	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Inhalation	On-site	Quant	Particulates in air from soil are available for exposure during outdoor activities.
Current	Subsurface Soil	Vapors	SCD Facility	Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
				Construction Worker	Adult	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
			Wetlands	Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
				Construction Worker	Adult	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
			Upland Forested Areas	Industrial Worker	Adult	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
				Construction Worker	Adult	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Inhalation	On-site	Quant	Volatiles in the air from the soil are available for exposure during outdoor activities.
Current/Future	Water	Surface Water	Red Lion Creek	Recreational Fisher	Adult	Dermal Absorption	On-site	Quant	Fishers may be exposed to contaminants in Red Lion Creek.
						Ingestion	On-site	Quant	Fishers may be exposed to contaminants in Red Lion Creek.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Pre-Adolescent/Adolescent trespasser may be exposed to contaminants in Red Lion Creek.
						Ingestion	On-site	Quant	Pre-Adolescent/Adolescent trespasser may be exposed to contaminants in Red Lion Creek.
				Resident	Adult	Dermal Absorption	On-site	Quant	Adults may be exposed to contaminants in Red Lion Creek.
						Ingestion	On-site	Quant	Adults may be exposed to contaminants in Red Lion Creek.
					Child	Dermal Absorption	On-site	Quant	Child may be exposed to contaminants in Red Lion Creek.
						Ingestion	On-site	Quant	Child may be exposed to contaminants in Red Lion Creek.
	Sediment	Sediment	Red Lion Creek	Recreational Fisher	Adult	Dermal Absorption	On-site	Quant	Fishers may be exposed to sediments in Red Lion Creek.
						Ingestion	On-site	Quant	Fishers observed fishing along Red Lion Creek.
				Tresspasser/Visitor	Pre-Adolescent/Adolescent (1)	Dermal Absorption	On-site	Quant	Pre-Adolescent/Adolescent trespasser may be exposed to contaminants in Red Lion Creek.
						Ingestion	On-site	Quant	Pre-Adolescent/Adolescent trespasser may be exposed to contaminants in Red Lion Creek.
				Resident	Adult	Dermal Absorption	On-site	Quant	Adults may be exposed to sediments in Red Lion Creek
						Ingestion	On-site	Quant	Adults may be exposed to sediments in Red Lion Creek.
					Child	Dermal Absorption	On-site	Quant	Child may be exposed to sediments in Red Lion Creek.
						Ingestion	On-site	Quant	Child may be exposed to sediments in Red Lion Creek.

The age group 7-18 Pre-adolescent/Adolescent applies to the trespasser only.

Table 2
Proposed Sample Summary
Standard Chlorine of Delaware Site

Sample ID	Location	Intervals	Rationale	ANALYSIS													FIELD MEASUREMENTS							
				TAL Metals (in water = total, dissolved, cyanide)	TCL Organics (VOC/SVOC/Pest/PCB/flex clause)	Pest/PCB only	Field Screen TCL	Dioxin	Soil gas	TOC	SEM AVS	Grain Size	% Moisture	Hardness	Alkalinity	Chloride	pH	Temp.	Cond.	Turb.	Redox	DO	TDS
RISK ASSESSMENT SOIL SAMPLES																								
TBD	PCB Concentration Area	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Catch Basin #1	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Western drainage ditch along the railroad tracks	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Warehouse	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Drum Cleaning Area	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Northern end of eastern drainage ditch	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Truck loading area	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Wastewater Treatment Plant	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Process Area	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Process Area	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Suspect barren area to the northeast of the SCD facility	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Western drainage path	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
	Air Products drainage ditch	0' - 6 inches 6 inches - 4 feet	To quantify contaminant concentrations for use in risk assessment and remedial planning, complete the air model (grain size), and evaluate bioavailability (TOC)	X	X			X	X	X		X	X										
NATURE AND EXTENT SOIL BORING SAMPLES																								
TBD	200 x 200 ft grid (30 onsite and 20 offsite locations)	0' - 6 inches	To determine nature and extent.				X																	
		5' - 7 feet	To determine nature and extent.				X																	
		10' - 12 feet	To determine nature and extent.				X																	
		15' - 17 feet	To determine nature and extent.				X																	
		20' - 22 feet	To determine nature and extent.				X																	
		25' - 27 feet	To determine nature and extent.				X																	
		30' - 32 feet	To determine nature and extent.				X																	
		35' - 37 feet	To determine nature and extent.				X																	
		40' - 42 feet	To determine nature and extent.				X																	
		45' - 47 feet	To determine nature and extent.				X																	
		50' - 52 feet	To determine nature and extent.				X																	
		55' - 57 feet	To determine nature and extent.				X																	
		60' - 62 feet	To determine nature and extent.				X																	
		65' - 67 feet	To determine nature and extent.				X																	
		70' - 72 feet	To determine nature and extent.																					
NATURE AND EXTENT SOIL BORING QC SAMPLES																								
TBD	2 locations (first two borings)	Every other depth interval	To perform QC check on field GC/MS screening.	X	X			X		X		X	X										
NATURE AND EXTENT SOIL BORING FULL SCAN SAMPLES																								
TBD	50 locations (each boring)	Depth interval with highest PID	To collect CLP (TCL/TAL) data at each boring location.	X	X			X		X		X	X										
TEST PIT SAMPLES																								
TBD	Suspect barren area to the northeast of the SCD facility	0' - 4 feet	To determine nature and extent.				X																	
WASTE SAMPLES (SLUDGE)																								
TBD	Onsite tanks and catch basins	---	To characterize wastes for disposal.	X		X	X	X																
SEDIMENT AND SURFACE WATER SAMPLES																								
TBD	Unnamed tributary wetland to the west of the wooded area north of the facility	---	To quantify contaminant concentrations for use in risk assessment and remedial planning. To evaluate bioavailability (TOC/alk) and hardness.	X	X					X	X	X	X	X	X								
	Unnamed tributary wetland to the west of the wooded area north of the facility	---	To quantify contaminant concentrations for use in risk assessment and remedial planning. To evaluate bioavailability (TOC/alk) and hardness.	X	X					X	X	X	X	X	X								
	Unnamed tributary wetland to the west of Air	---	To quantify contaminant concentrations for use in risk assessment and remedial planning. To evaluate bioavailability (TOC/alk) and hardness	X	X					X	X	X	X	X	X								
	Red Lion Creek wetland to the east	---	To quantify contaminant concentrations for use in risk assessment and remedial planning. To evaluate bioavailability (TOC/alk) and hardness	X	X					X	X	X	X	X	X								
	Red Lion Creek	---	To quantify contaminant concentrations for use in risk assessment and remedial planning. To evaluate bioavailability (TOC/alk) and hardness	X	X					X	X	X	X	X	X								
	Red Lion Creek	---	To quantify contaminant concentrations for use in risk assessment and remedial planning. To evaluate bioavailability (TOC/alk) and hardness	X	X					X	X	X	X	X	X								
	Red Lion Creek	---	To quantify contaminant concentrations for use in risk assessment and remedial planning. To evaluate bioavailability (TOC/alk) and hardness.	X	X					X	X	X	X	X	X								
GROUNDWATER SAMPLES - existing wells																								
TBD	60 existing Columbia wells and 4 Potomac	---	To evaluate the Columbia nd Potomac aquifers in the vicinity of the site.																					

Table 3
Ecological Risk Assessment
Proposed Assessment and Measurement Endpoints
Standard Chlorine of Delaware Site

Assessment Endpoint	Risk Question	Testable Hypotheses		Measurement Endpoint(s)	Habitats
AE 1: Protection of biological diversity in the aquatic environment.	Do concentrations of the COPC adversely affect the abundance and diversity of water column organisms?	H_0	Concentrations do not exceed those known to affect the occurrence and abundance of aquatic organisms that inhabit the surface waters at the site.	ME 1.1: Compare the concentrations of COPC in surface water to those known to adversely affect aquatic organisms.	Red Lion Creek Emergent Wetlands (All) Open Water Forested Wetland
		H_1	Concentrations exceed those known to affect the occurrence and abundance of aquatic organisms that inhabit the surface waters at the site.		
AE 2: Protection of biological abundance and diversity in the macroinvertebrate community.	Do concentrations of the COPC adversely affect the abundance and diversity of the macroinvertebrate community?	H_0	Concentrations do not exceed those known or demonstrated to adversely affect the abundance and diversity of benthic macroinvertebrates that inhabit the sediments at the site.	ME 2.1: Compare the concentrations of COPC in sediment to those known to adversely affect benthic macroinvertebrates.	Red Lion Creek Emergent Wetlands (All) Open Water Forested Wetland
AE 3: Protection of nutrient cycling and terrestrial invertebrate populations in surface soils at the SCD site.	Are concentrations of the COPC in surface soil at levels known to adversely affect nutrient cycling or soil invertebrate populations?	H_0	Concentrations do not exceed those known to adversely affect nutrient cycling and soil invertebrate populations at the site.	ME 3.1: Compare the concentrations of COPC in surface soil to those known to adversely affect nutrient cycling or soil invertebrate populations.	Upland Forest SCD Facility
		H_1	Concentrations exceed those known to adversely affect nutrient cycling and soil invertebrate populations at the site.		
AE 4: Protection of herbivorous wildlife populations at the SCD site.	Do concentrations of COPC in plant materials consumed by herbivores and in soil/sediment incidentally ingested affect populations of herbivores?	H_0	Concentrations of COPC in plants and soil/sediments do not exceed those known or demonstrated to adversely affect survival, growth, or reproduction in herbivorous wildlife that forage at the site.	ME 4.1: Estimate COPC concentrations from plant tissue and sediment sampling though a food chain model to develop an average daily dose. Compare this dose to TRVs known to be protective of herbivorous mammals and/or birds.	Emergent Wetlands (All) Open Water Forested Wetland Upland Forest SCD Facility
		H_1	Concentrations of COPC in plants and soil/sediments exceed those known or demonstrated to adversely affect survival, growth, or reproduction in herbivorous wildlife that forage at the site.		
AE 5: Protection of aquatic insectivorous wildlife populations at the SCD site.	Do concentrations of COPC in benthic macroinvertebrate tissue consumed by insectivores and in soil/sediment incidentally ingested affect populations of insectivores?	H_0	Concentrations of COPC in benthic macroinvertebrates and soil/sediments do not exceed those known or demonstrated to adversely affect survival, growth, or reproduction in insectivorous wildlife that forage at the site.	ME 5.1: Estimate COPC concentrations from benthic macroinvertebrate tissue and sediment sampling though a food chain model to develop an average daily dose. Compare this dose to TRVs known to be protective of herbivorous mammals and/or birds.	Emergent Wetlands (All) Open Water Forested Wetland
		H_1	Concentrations of COPC in benthic macroinvertebrates and soil/sediments exceed those known or demonstrated to adversely affect survival, growth, or reproduction in insectivorous wildlife that forage at the site.		
AE 6: Protection of terrestrial vermivorous wildlife populations at the SCD site.	Do concentrations of COPC in earthworm tissue consumed by insectivores and in soil/sediment incidentally ingested affect populations of vermivores?	H_0	Concentrations of COPC in earthworms and soil/sediments do not exceed those known or demonstrated to adversely affect survival, growth, or reproduction in vermivorous wildlife that forage at the site.	ME 6.1: Estimate COPC concentrations from earthworm tissue and soil sampling though a food chain model to develop an average daily dose. Compare this dose to TRVs known to be protective of herbivorous mammals and/or birds.	Upland Forest SCD Facility
		H_1	Concentrations of COPC in earthworms and soil/sediments exceed those known or demonstrated to adversely affect survival, growth, or reproduction in vermivorous wildlife that forage at the site.		
AE 7: Protection of piscivorous wildlife populations at the SCD site.	Do concentrations of COPC in fish tissue consumed by piscivorous and in soil/sediment incidentally ingested affect populations of piscivores?	H_0	Concentrations of COPC in fish tissue and soil/sediments do not exceed those known or demonstrated to adversely affect survival, growth, or reproduction in piscivorous wildlife that forage at the site.	ME 7.1: Estimate COPC concentrations from fish tissue and sediment sampling though a food chain model to develop an average daily dose. Compare this dose to TRVs known to be protective of piscivorous mammals and/or birds.	Red Lion Creek Open Water
		H_1	Concentrations of COPC in fish tissue and soil/sediments exceed those known or demonstrated to adversely affect survival, growth, or reproduction in piscivorous wildlife that forage at the site.		

Figures

SEE ATTACHED FILE FOR FIGURES

Appendix A – EPA Statement of Work

SEE ATTACHED FILE FOR APPENDIX A

Appendix B – Scoping Meeting Minutes

BLACK & VEATCH Special Projects Corp.
Philadelphia Office

MEMORANDUM

Standard Chlorine of Delaware B&V Project 47123.0101
RI/FS Scoping Meeting October 30, 2003

To: Chris Wolfe

From: Jody Shade
CC: John Taylor, Dane Pehrman

This memo summarizes the Standard Chlorine Remedial Investigation/Feasibility Study (RI/FS) scoping meeting held October 30, 2003 at the EPA offices from 9:30 a.m. to 11:30 a.m.

Attendees: Hilary Thornton (HT), EPA Work Assignment Manager
Alphonse Pinero (AP), EPA Contracting Officer
Jim McKenzie (JM), EPA Project Officer
Chris Wolfe (CW), BVSPC Work Assignment Manager
John Taylor (JT), BVSPC RACS Program Manager
Dane Pehrman (DP), BVSPC Project Scientist
Jody Shade (JS), BVSPC Project Scientist

Black & Veatch Special Projects Corp. (BVSPC) presented a general approach for the RI/FS which included focusing on the SCD facility with a limited focus on the area to the north of the facility. BVSPC proposed that the first action item would be to characterize the various wastes on the site located in the wastewater treatment plant (WWTP), warehouse, catch basins, and tanks on the site. A suspicious barren area was identified to the north west of the facility with an access road leading to it. BVSPC presented a general grid pattern for the collection of surface and subsurface soil sampling extending to the clay layer (down to 70 feet in some areas) within the facility and to the area north of the facility. Sediment and surface water samples were proposed for drainage areas on the facility and within Red Lion Creek (given the age of the old RI data). BVSPC proposed the installation and sampling of two groundwater monitoring wells on the Air Products property into the Potomac aquifer as well as the sampling of the three existing Potomac wells. Air monitoring and limited air sampling was proposed for the facility at four perimeter stations. Wipe samples were proposed for the onsite buildings. BVSPC proposed to use EQuIS for all data management activities.

Upcoming Technical Scoping Meeting

Several of the items discussed during the meeting were deferred for discussion at an additional scoping meeting that will include the EPA technical staff: Biological Technical Assistance Group (BTAG), hydrogeologist, etc. This technical scoping meeting is

scheduled for November 27, 2003. It was agreed that a new due date for the Draft Work Plan (WP) submission will be established during this meeting. The following items should be discussed during this meeting:

- Ultimate goal of cleanup (grass field vs. clean facility)
- Field screening approach using portable GC/MS
- Sampling Grid
- Appropriate analyses
- Ecological Risk Assessment
- Human Health exposure pathways
- Air sampling and modeling
- Tidal influence study
- Building samples
- Lead based paint sampling
- Asbestos sampling

General

- HT stated that the original end date of March 15, 2008 may either be changed (possible June 2007) or a Completion Form assignment could be issued and the work to be finished post-RAC contract completion date. This issue has not been resolved by the EPA.
- HT recommended that interviews be conducted with the current staff at the SCD site. The plan is for the EPA removal group to be finished within 6 months. They are currently decontaminating the wastewater treatment plant (WWTP) and getting ready to shut it down in the spring 2004. It has not been decided by the EPA who will be responsible for cleaning out the WWTP, the removal group or the remedial group. The removal group is also cleaning the existing drainage system on the site which includes some tanks, pads, lines, and drains in the process area.
- The screening approach with limited CLP samples was considered acceptable to meet the goals for characterizing nature and extent at the site. This should be discussed further at the scoping meeting with the EPA technical staff.
- The well survey conducted by DNREC is acceptable for use in this RI/FS.
- No residential sampling is necessary for this RI/FS.
- A backpack GPS unit is acceptable for the land survey activities.

- BVSPC should check with DNREC to inquire whether or not the existing monitoring well analytical data includes the full scan of CLP constituents. If not, the WP should include budget for sampling several of the onsite Columbia aquifer wells for the full scan of CLP constituents.
- Seismic refraction is acceptable for determining continuity of clay layer between the Columbia and Potomac aquifer.
- Insitu thermal desorption should be considered – Treatability Study or pilot study.
- A conflict of interest statement must be submitted given the potential work on the Occidental Chemical site, on which BVSPC has worked for the US Army Corp of Engineers.
- It was agreed that the Sampling and Analysis Plan (SAP) be submitted 21 days after the approval of the WP.

Coordination with Emergency Response Team (Mike Toll, team leader)
The following items should be discussed/confirmed with Mike Toll at the SCD facility:

- What areas of the WTP would likely need to be demolished in order to sample under or around?
- Is there a GC/MS available at the site?
- What is the status of the package boiler?
- Results of warehouse waste characterization.
- A transition meeting should be scheduled with the removal group currently at the site and include Chris Wolfe (CW) and HT.

Work Plan Budget Assumptions

- Assume that the goal of this RI/FS is to produce a clean facility, not a grassed field. This goal should be discussed further at the upcoming technical scoping meeting.
- Prepare WP budget for cleaning out the WWTP and demolishing several tanks, the WTP, and other small vessels as needed for investigation purposed only (i.e. to obtain samples).
- Assume 24-hours, 7-day security with video surveillance at least until the wastes on the site are all contained and in a solid phase. At that time, the security could potentially be reduced. Need to check the Homeland Security guidelines to see if there are specifications for chemical plant security.

- Assume rental of GC/MS. Jim McKenzie stated that EPA can not buy this equipment, but BVSPC could buy it and charge a rental fee to the project.
- Assume that asbestos and lead-based paint sampling will occur in the onsite buildings. Asbestos will be a DAS request and an XRF is acceptable for testing for lead-based paint.
- Assume hand-entering of all analytical results. WP budget should include an LOE estimate that is similar to the estimate submitted for the RD at the site.
- Assume 10,000 cubic yards of demolition debris for sampling purposes only.
- Assume construction of some haul roads. This work can be built into the drilling subcontract, or subcontracted separately.
- Assume that test pits may be necessary, especially in the unknown area to the east of the facility.
- Assume that all disposal costs for data acquisition regard investigation derived wastes. Disposal of actual wastes on site should be addressed under a different contracting mechanism.
- Do not budget for post RI/FS activities.
- EPA will conduct community relation interviews, and write ads, fact sheets, and the community relations plan. BVSPC will attend public availability meetings and provide technical support on the visual aids. Assume that the BVSPC PM will attend 10 community availability sessions over the 4-year project. WP budget should include costs for rental car, 20 LOE per meeting for visual aids, and $100 per meeting for other direct costs (ODC) for visual aids.

BLACK & VEATCH Special Projects Corp.
Philadelphia Office

MEMORANDUM

Standard Chlorine of Delaware — B&V Project 47123.0101
RI/FS Technical Scoping Meeting — November 26, 2003

To: Chris Wolfe

From: Jody Shade
cc: John Taylor, Dane Pehrman
Mike Napolitan

This memo summarizes the Standard Chlorine Remedial Investigation/Feasibility Study (RI/FS) technical scoping meeting held November 27, 2003 at the EPA offices from 10:00 a.m. to 12:30 p.m.

Attendees: Hilary Thornton (HT), EPA Work Assignment Manager
Bruce Pluta (BP), EPA BTAG
Simeon Hahn (SH), EPA BTAG
Bruce Rendell (BR), EPA Geologist
Dawn Ioven (DI), EPA Toxicologist
Chris Wolfe (CW), BVSPC Work Assignment Manager
Dane Pehrman (DP), BVSPC Project Scientist
Jody Shade (JS), BVSPC Project Scientist
Mike Napolitan (MN), BVSPC Project Geologist

Black & Veatch Special Projects Corp. (BVSPC) presented a general approach for the RI/FS which included focusing on the SCD facility with a limited focus on the area to the north of the facility and the suspect area to the northeast of the facility.

General

- A revised submission date for the RI/FS Work Plan (WP) was established for Monday, January 5, 2004. CW agreed to submit the other planning documents (HASP, QAPP, FSP, DMP, SMP) 21 days after the submission of the WP.
- HT stated that since Metachem has declared bankruptcy, the grandfather clause has been revoked, which allowed heavy industry on the floodplain of the Delaware River. Given this, a light industrial or commercial reuse would be more likely for the facility.
- HT reiterated that a “clean empty industrial facility” remains the goal for this RI/FS. He stated that the equipment is owned by a liquidation company that is required to take all of the equipment; however, there is no enforcement action or timeframe in place.

- It was agreed that a grid approach is sufficient to determine nature and extent of contamination, however a more concentrated approach should be used for risk assessment and off site (areas outside facility boundary) sampling.
- There was no objection to the field GC/MS approach for nature and extent determination in soil.
- It was agreed upon by DI and BP that the primary focus of the risk assessments should be to determine locations of maximum contamination for the purposes of establishing clean up goals. This focus is based on the historical data for the site concluding that the site is contaminated and is expected to present both a human health and ecological risk.

Human Health Risk Assessment (HHRA)

- DI stated that a subsurface soil investigation is necessary to determine the source areas contribution to the groundwater; however, a residential scenario for soil is not necessary in the baseline HHRA if deed restrictions are put in place.
- DI stated specifically that the following scenarios should be evaluated (but not limited to) in the HHRA
    1. Trespassers/Construction workers/Industrial workers – soil (inhalation/dermal)
    2. Residential – groundwater (inhalation/ingestion/dermal)
    3. Industrial/Construction Worker – air (inhalation)
- Table 1 should be submitted with the Work Plan.
- DI stated that air monitoring stations are not necessary; air modeling can be conducted using surface soil and soil gas analytical results.
- SH suggested that soil gas screening could be conducted to focus the sampling locations for risk assessment.
- It was later agreed upon that soil gas samples could be collected within the top 5 feet at risk assessment sampling locations, but not at every node within the grid. Risk assessment sampling locations should be concentrated in suspected areas of high contamination.
- DI stated that wipe samples (dust) are not necessary for the purposes of HHRA, although they may be looked at qualitatively or used to determine whether or not the building contain surface contamination.

Ecological Risk Assessment (ERA)

- BP stated that BVSPC should revisit the conceptual site model (CSM) already established and evaluated at the site. BVSPC should focus the facility RI/FS on data gaps that exist in the current baseline ERA. He requested that this evaluation take place before the WP is submitted.
- BP stated that dioxins should be addressed in the ERA.
- BP stated that BVSPC should investigate the groundwater to surface water interface.
- BP requested that all risk assessment spreadsheets be transmitted in an Excel format in additional to a PDF for the final format.

Geological Investigation

- BR was in agreement that a seismic refraction should be conducted at the site to determine the extent of the clay layer.